GOVDOC
BRA
1814
1991 ed.

BOSTON
PUBLIC
LIBRARY

BOSTON
PUBLIC
LIBRARY

GOVDOC
BRA
1814
1991 ed.

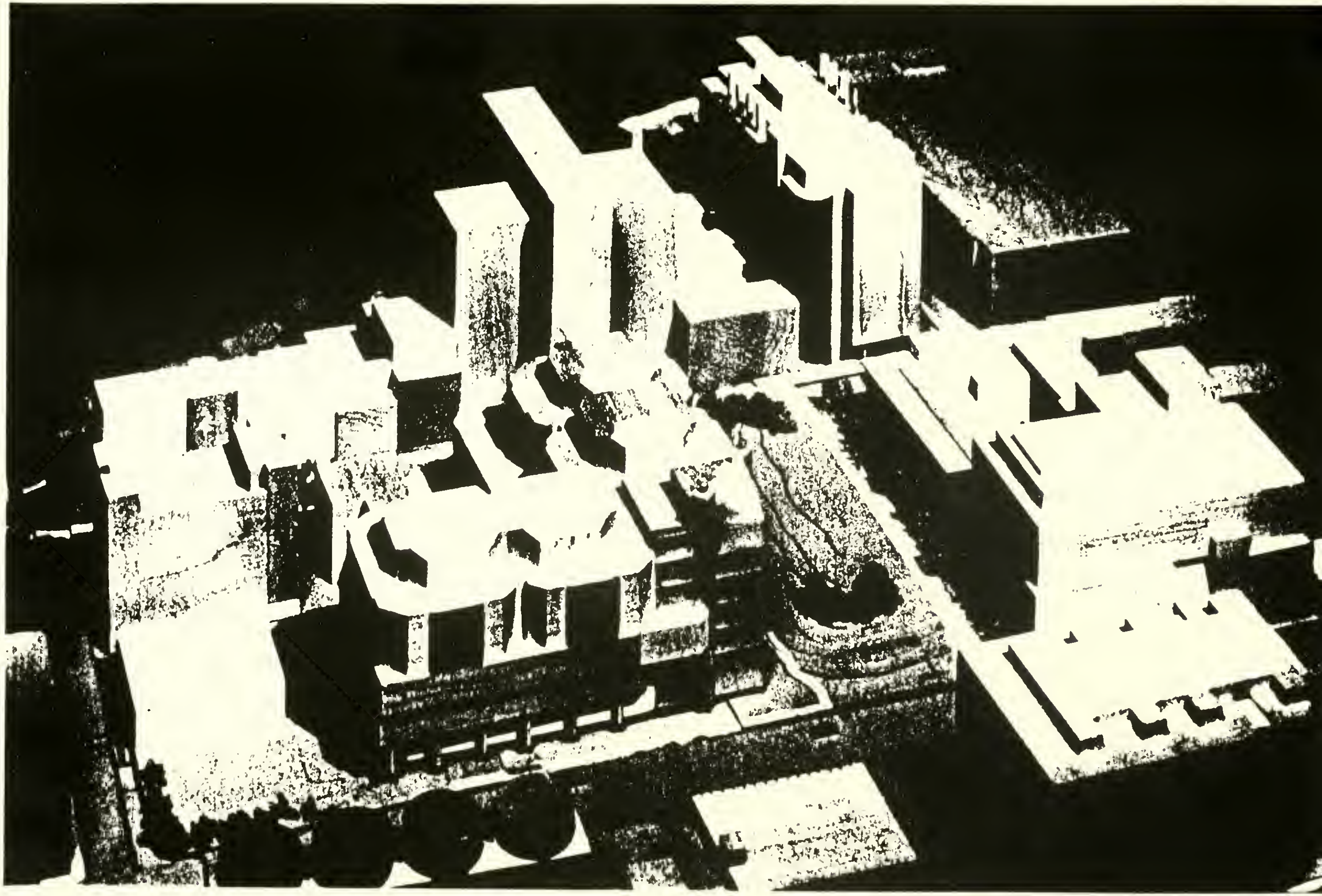
BOSTON
PUBLIC
LIBRARY

New England Deaconess Hospital

FACILITIES MASTER PLAN

1990-2000

Updated, January, 1991



NEW ENGLAND DEACONESS HOSPITAL

FACILITIES MASTER PLAN

Table of Contents

Page

Executive Summary 1

I. Introduction 8

II. Existing Campus, Facilities and Programs 9

- A. The Main Campus 9
  - 1. Boundaries and Zoning 9
  - 2. Surrounding Uses 9

- B. Existing Facilities, Programs and Uses 10
  - 1. Buildings 10
  - 2. Age of Physical Plant 11
  - 3. Programs and Uses 12
  - 4. Research 13
  - 5. Massing 15
  - 6. Traffic Circulation 15
  - 7. Loading Areas 16
  - 8. Parking 16
  - 9. Traffic Volumes 17
  - 10. Pedestrian Circulation 17
  - 11. Open Space 18
  - 12. Building Utilities 18

- C. Employment 19

- D. Public Benefits 20

III. The Planning Process 23

IV. Planning Objectives 24

V. Factors Influencing Planning Decisions 26

- A. External Factors 26
  - 1. Growing Demand 26
  - 2. Space Limitations 27

- B. Internal Factors 28
  - 1. Physical Needs 28
  - 2. Organizational and Programmatic

Needs 30
3. Research Space 32

VI. The Master Plan 34

A. Uses and Density 34

B. Traffic and Parking 35

C. Entry/Image 35

D. Pedestrian Circulation 36

VII. Specific Development Projects 37

A. New Ambulatory Care 37

B. Day Care 39

C. New Clinical Facility 39

D. New Research Facility 43

E. Shields Warren Radiation Laboratory 45

F. Computer Building Addition 46

G. Renovation of Existing Clinical Space 47

VIII. Environmental Impacts and Mitigation 48

A. Operational Impacts and Mitigation 50
1. Proposed Clinical Facility 50
2. Ambulatory Care Facility 53
3. Research Facility 54
4. Computer Building Addition 56

B. Urban Design 56

C. Construction Impacts and Mitigation 57

D. Cumulative Construction Impacts 59

IX. Public Review Process 62

X. Public Benefits 64

XI. Conclusion 67

LIST OF EXHIBITS AND APPENDICES

Exhibit A - Site Plan
Exhibit B - Existing Use Site Plan
Exhibit C - Site Circulation
Exhibit D - Parking
Exhibit E - Sewer System
Exhibit F - Utility Distribution (Electrical)
Exhibit G - Utility Distribution (Water)
Exhibit H - Master Site Plan

Appendix A - Vanasse/Hangen Traffic Study, dated May 16, 1986
Appendix B - Abend Transportation Access Plan, dated November 6, 1987

NEW ENGLAND DEACONESS HOSPITAL

FACILITIES MASTER PLAN

EXECUTIVE SUMMARY

New England Deaconess Hospital is a sophisticated tertiary care institution known for academic excellence and research of the highest standards. The Hospital recognizes the need to plan well into the future in order to effectively anticipate and respond to the needs of its patients, doctors, and the medical community as a whole. This Facilities Master Plan is a planning tool that will assist the Hospital in directing the utilization and deployment of its resources into the next decade.

The Hospital's campus is located on the westerly side of Brookline Avenue on approximately 376,000 square feet of land (excluding areas within streets) within the Longwood Medical Area of Boston. The surrounding Longwood Medical Area is characterized by medical institutions and health care-related uses. The Riverway parkway and park area bounds the Deaconess campus to the immediate west and south.

Space within the Deaconess campus and the Longwood Medical Area is at a premium. It is therefore imperative that Deaconess make sound planning decisions in the utilization of its facilities. Existing overcrowded conditions have forced the Hospital to resort to makeshift and often inefficient dispersions of programs and departments. Because of space limitations and other deficiencies in the Hospital's physical plant, the Hospital has found it difficult to efficiently operate existing programs

and to introduce new technologies. Yet, the demand for the Hospital's services, and an ever wider range of programs, research capabilities and technology is increasing at an astounding rate.

It is not physically or financially feasible for the Hospital to address all of its physical needs simultaneously. The Hospital has established priorities for facilities reorganization and modernization on the basis of the Hospital's planning goals, the immediacy and urgency of the existing identified deficiencies and the anticipated trends in the delivery and financing of health care services.

The Hospital has targeted those portions of its physical plant which are obsolete and incapable of supporting its programs for renovation and redevelopment. It has adopted a Master Plan which combines a reorganization of existing functional space with the upgrading of outdated space. In general, high density diagnostic and patient care uses will remain in the center of campus. Medical research functions will be concentrated in close proximity to the primary patient care facilities. Upgraded commercial/retail uses will be clustered along Brookline Avenue, while existing parking facilities at the edge of the campus will be retained.

Master Plan Projects.

The Hospital has identified several specific development projects to upgrade its facilities. The three primary projects

are the renovation of the Kennedy Building located at 1 Autumn Street into an ambulatory care center, the construction of a new clinical facility adjacent to the intersection of Pilgrim Road and Deaconess Road extending to Brookline Avenue, and the construction of a new research facility in the current location of the Maintenance Building on Pilgrim Road. These projects do not represent a major expansion of the Hospital, but are instead designed to address existing deficiencies and accommodate anticipated needs.

New Ambulatory Care Facility.

The elimination of the school of nursing formerly housed in the Kennedy Building and the renovation of the interior of that Building into an ambulatory care center was recently completed. This seven (7) story, 85,000 gross square foot ambulatory care center addresses one of the Hospital's most pressing needs while generating no significant operating impacts on surrounding areas. All of the renovations were interior and therefore the size and exterior appearance of the Building is unchanged. No significant increase in staff levels has occurred at the Kennedy Building as a result of the change in use, and vehicle trips generated by the building, while formerly clustered around the peak commuting hours, are now concentrated between the hours of 10:00 a.m. and 3:00 p.m. The facility will generate an estimated twenty vehicle trips per hour between these hours, and sufficient parking has been set aside in the nearby Pilgrim Road Garage.

New Clinical Facility.

Deaconess also proposes to construct an approximately 235,000 gross square foot patient care facility to be located at 25 Deaconess Road. The construction of this facility will be preceded by the demolition of Harris Hall, an obsolete structure currently containing support functions. The new clinical facility will be located across Pilgrim Road from the Hospital's existing primary patient care building and will be connected to that building by glass-enclosed, elevated passageways above Pilgrim Road at levels 3 through 5. This will enable the two buildings to function as a coherent patient care facility.

Generally, diagnostic and treatment functions will be upgraded and relocated into the new clinical facility. The new facility will alleviate existing overcrowded conditions in the Hospital's primary patient care facilities and will provide the necessary space for efficient realignment and operation of the Hospital's existing programs and departments. It is not intended as an expansion of the Hospital's programs and therefore is not expected to generate a significant net increase in Hospital personnel or create the need for a significant amount of increased parking or other support functions.

In conjunction with the construction of the new clinical facility, the Hospital will also modernize its existing clinical space. This space, which is located in the Palmer, Baker, Farr and Deaconess Buildings directly across Pilgrim Road from the

proposed location of the new clinical facility, needs substantial renovation and upgrading. The Hospital will undertake a program to correct the deficiencies in this space and to make it work coherently with the new clinical facility.

New Research Facility.

The Hospital has identified an urgent need for modern research space in proximity to its clinical programs. The Hospital intends to address a major portion of this need through the construction of a six-story research facility at the current location of the Maintenance Building and doctor's parking lot between Pilgrim Road and Autumn Street. The Maintenance Building, which is in poor condition and badly outdated, will be demolished to make way for the new facility.

The new research facility will be ideally located near the Hospital's clinical programs in order to accommodate the Hospital's focus on patient care research. The new facility will enable the Hospital to consolidate many of its research programs which are currently dispersed in space on and off-campus, and will help to relieve overcrowded conditions within existing research space. The new research facility will also enable the Hospital to demolish the outdated CRI Building along Pilgrim Road.

Other Projects.

In addition to these major projects, the Hospital is also undertaking other measures to upgrade its facilities and support

its programs and personnel. A day care center accommodating up to fifty-eight children has recently been completed within the Maintenance Building. This day care space will be relocated elsewhere on campus when the Maintenance Building is demolished to make way for the new research facility. The Hospital is also adding three floors containing approximately 4100 square feet each between its existing Baker and Palmer Buildings. This space along with additional space leased off-campus will help to alleviate the Hospital's need for support space which will be created by the demolition of Harris Hall. The Hospital is also completing an addition to the fifth floor of its Shields Warren Radiation Laboratory located off campus across Brookline Avenue. This addition will contain 2,500 square feet of space and is the completion of a floor which was partially constructed several years ago.

This Facilities Master Plan discusses both the short term construction impacts and long term operational impacts that the Hospital's proposed projects and renovations will have on the surrounding community. The Hospital has carefully considered development alternatives and has attempted to mitigate potential detrimental impacts wherever possible. In a bold mitigation strategy to help alleviate traffic congestion on Brookline Avenue, the Hospital has pledged land sufficient to add an additional travel lane between Deaconess Road and Francis Street in conjunction with construction of the new clinical facility. The Hospital anticipates continuing to work with State, City and

Community leaders to identify and minimize environmental impacts through the MEPA process and the City's zoning and environmental review process.

New England Deaconess Hospital plays an integral part in the economy and well-being of the City of Boston and is also an important neighbor to its surrounding community. The Hospital's development and renovation plans will have substantial beneficial impacts on the community and the City. The appearance of the Longwood Medical area will be enhanced, pedestrian and vehicular transportation in the area should be improved, and the Hospital's redevelopment programs will generate significant linkage and other indirect revenue to the City.

The Hospital believes that it can successfully implement a program of renovation and modernization that will allow it to continue as one of Boston's pre-eminent medical institutions well into the twenty-first century, while still maintaining sensitivity to the concerns of the City and local community. This Master Plan is one tool to help strike that balance.

NEW ENGLAND DEACONESS HOSPITAL

FACILITIES MASTER PLAN

I. INTRODUCTION.

New England Deaconess Hospital is the third largest teaching hospital in the City of Boston, drawing the majority of its patients from New England and eastern New York state. A primary affiliate of Harvard Medical School, Deaconess is a sophisticated tertiary care institution known for academic excellence and research of the highest quality.

Modern health care institutions like Deaconess must be capable of responding quickly to the changing needs of their patients, doctors and staff and to the medical community at large. Careful planning is essential to the ability of these institutions to anticipate and respond effectively to those needs.

This Facilities Master Plan establishes the general framework for the utilization and development of New England Deaconess Hospital's physical resources over the next decade. It targets areas of development as well as areas for reorganization and modernization. It is a flexible planning document that must be periodically re-evaluated and revised in order to respond to unanticipated factors and developments in the health care field.

II. *EXISTING CAMPUS, FACILITIES AND PROGRAMS.*

A. *The Main Campus.*

1. *Boundaries and Zoning.* New England Deaconess Hospital's main campus is located in the Longwood Medical Area of Boston on the westerly side of Brookline Avenue. The main campus is a triangular area, containing approximately 376,000 square feet of land (excluding areas within streets), bounded generally by Brookline Avenue, Longwood Avenue, Joslin Park and the Riverway. See the Site Plan on the next page and attached as Exhibit A.

Much of the Deaconess campus is within an H (residential/ apartment) zoning district, while a small area along Brookline Avenue is within an L (local business and service) zoning district. The entire campus is within an Institutional Overlay District which requires that all new hospital-related uses obtain conditional use permits from the City of Boston Board of Appeal. The campus is also within a Restricted Parking Overlay District which prohibits off-street parking for nonresidential uses without a conditional use permit.

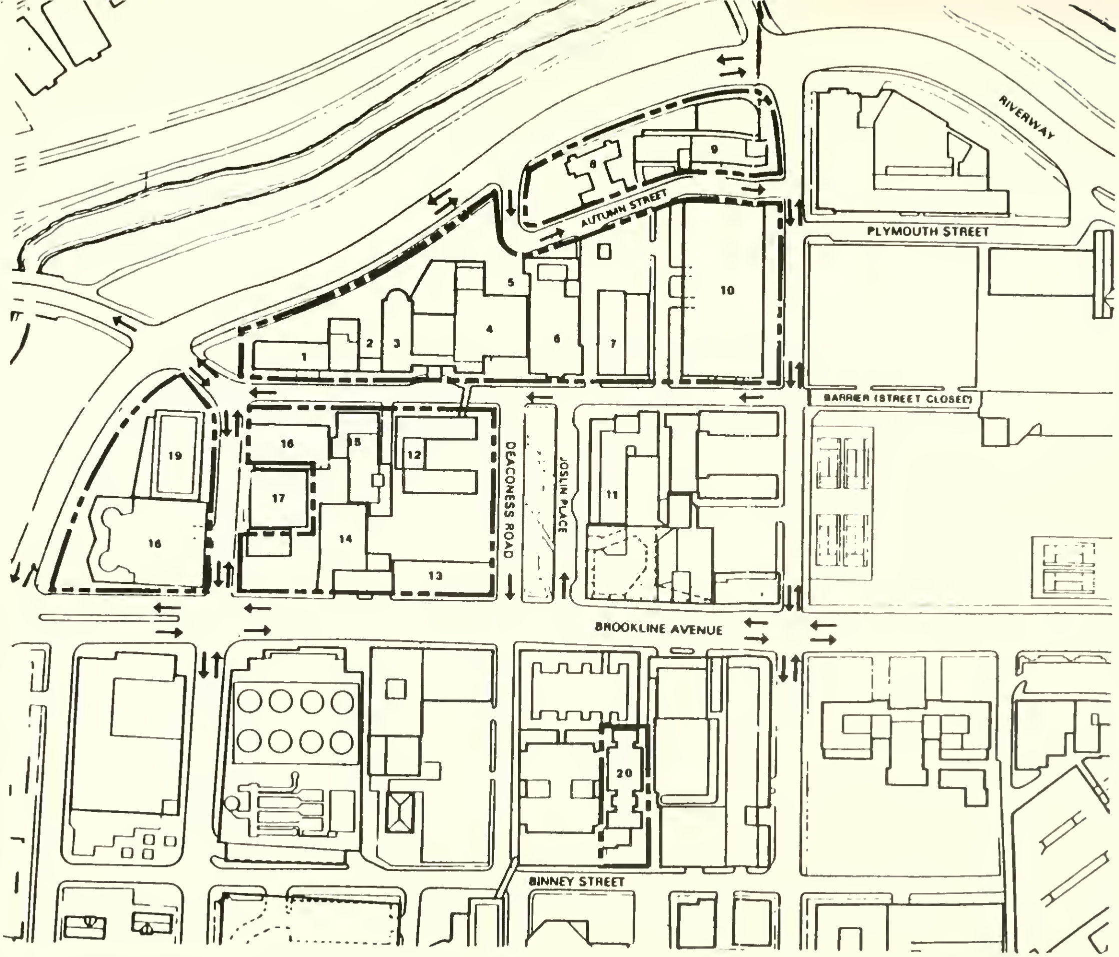
2. *Surrounding Uses.* The Longwood Medical Area which surrounds the Deaconess campus to the north and east is characterized by medical institutions and health care related uses. The Joslin Diabetes Center is located across Joslin Place from the Deaconess campus. Other major medical institutions in

Exhibit A

SITE PLAN

N.E.D.H. PROPERTY

AND TRAFFIC DIRECTIONS (EXISTING)



■ Building Key

1 PALMER	11 JOSLIN
2 COMPUTER	12 HARRIS
3 BAKER	13 COMMERCIAL
4 FARR	14 STORAGE
5 CHAPEL	15 C R I
6 DEACONESS	16 MEISSNER
7 MAINTENANCE	17 OVERHOLT
8 RIVERWAY	18 PARKING
9 KENNEDY	19 LOWRY
10 PARKING	20 SHIELDS WARREN

NEW ENGLAND DEACONESS HOSPITAL

PAYETTE ASSOCIATES/M. BOSTIN ASSOCIATE

0 50 150ft

vicinity include Brigham and Women's Hospital, Beth Israel Hospital, the Dana-Farber Cancer Institute and Children's Hospital.

The portion of Brookline Avenue immediately adjacent to the Deaconess campus is occupied by local commercial and retail uses. This commercial block is deteriorated and visually unattractive. A gasoline service station is located at the corner of Brookline Avenue and Francis Street. The Riverway parkway and park area is located to the immediate west and south of the campus.

B. *Existing Facilities, Programs and Uses.*

1. Buildings. The Existing Use Site Plan attached as Exhibit B identifies New England Deaconess Hospital's campus buildings. Chart 1 below provides a summary of the age, size and date of construction of each of the buildings shown on the Site Plan.

Chart 1

Building	Gross Floor Area	Stories	Height*	Date of Construction
1. Palmer	57,708 s.f.	6	72 ft.	1927 1937 1965
2. Computer	5,546 s.f.	2	24 ft.	1982
3. Baker	30,075 s.f.	6	86 ft.	1934
4. Farr	193,286 s.f.	13	156 ft.	1953 1971
5. Chapel		In Farr Building		1956
6. Deaconess	60,652 s.f.	5	60 ft.	1907

					1923
7.	Maintenance	26,588 s.f.	2	24 ft.	1959
8.	Apartments	33,600 s.f.	6	72 ft.	1928
9.	Kennedy	85,245 s.f.	7	84 ft.	1977
10.	Parking (Pilgrim Rd.)	751 Cars	5	60 ft.	1972 1978
11.	Joslin	Not owned by Deaconess			
12.	Harris	51,227 s.f.	5	60 ft.	1913 1927
13.	Commercial	8,000 s.f.	1	12 ft.	1930's
14.	Storage	11,200 s.f.	1	12 ft.	1930's
15.	Cancer Research Institute	42,530 s.f. + basement	3 to 5 at highest	60 ft.	1951 1959
16.	Meissner	60,544 s.f.	6	72 ft.	1976
17.	Overholt	Not owned by Deaconess			
18.	Parking (Francis St.)	310 Cars	5	60 ft.	1963
19.	Lowry	84,000 s.f.	10	120 ft.	1965
20.	Shields Warren	43,092 s.f.	6	36 ft.	1965

---

* Height based on assumed story height of twelve feet.

2. *Age of Physical Plant*. Although many of the Hospital's buildings still have long useful lives ahead of them, some of the buildings will require major investments to extend their serviceability. A study conducted for the Hospital in March 1985 by M. Bostin Associates and Payette Associates reviewed the condition of each of the Hospital's buildings located on its main campus. The buildings were categorized as follows:

Up to Date Buildings (only routine maintenance required):

- Lowry Medical Office Building
- Meissner Laboratory
- Farr Building (upper floors)
- Kennedy Hall
- Computer Building
- Francis Street Parking Garage

Buildings with Limited Deficiencies (require moderate updating of building systems):

- Cancer Research Institute
- Farr Building (lower floors)
- Palmer Memorial Building
- Baker Building
- Materials Center
- Pilgrim Road Garage

Buildings with Significant Deficiencies (obsolete - require major renovation):

- Deaconess Building
- Harris Hall
- Maintenance (labeled "Support" on Exhibit B)
- 306 The Riverway

3. ***Programs and Uses***. The Hospital's primary clinical and patient care facility is the Farr Building (Building 4). Support programs and additional inpatient programs are provided in the Palmer Building (Building 1), the Baker Building (Building 3) and the Deaconess Building (Building 6). The primary surgical areas are located in the Farr Building. Outpatient and ambulatory care services are currently provided in the Lowry Medical Office Building (Building 19). The Hospital has recently completed rehabilitation of the interior of the Kennedy Building replacing the existing school of nursing with a new ambulatory care facility. Other uses of on-campus buildings are indicated on Exhibit B.

Deaconess also maintains a relatively small amount of off-campus space. The Hospital's business office, comptroller's office and purchasing unit are located in approximately 38,480 square feet of space at 99 Brookline Avenue. The Hospital also utilizes approximately 20,000 square feet of space at 21-27 Burlington Street for research activities.

4. ***Research.*** New England Deaconess Hospital currently devotes approximately 70,890 square feet of space to laboratory research and associated support functions. This space is dispersed among the Cancer Research Institute ("CRI"), the Shields Warren Research Laboratory, 21-27 Burlington Avenue, 180 Longwood Avenue and the Palmer Building. Deaconess devoted over $12 million on research activities in 1990, employing a total of fifty-six (56) research laboratory chiefs. These laboratory chiefs, all of whom also see patients, supervised 169 post-doctoral fellows, research associates, research technicians and junior faculty. The Hospital's sources of research funding in 1990 included approximately $9 million of federal government funds, approximately $3 million of private industry funds and approximately $750,000 of Foundation funds.

Research is performed in a variety of departments including medicine, surgery, radiology, pathology and others. The Hospital's existing research programs include:

- Laboratory Research on AiDS and AIDS related problems. Includes research programs to better define the life cycle of the virus that causes this disease.

- Laboratory research on nutrition. Includes the study of medical problems in ingesting, absorbing and adequately utilizing nutrients. In addition, research is being undertaken to better define which nutrients best provide specific physiological benefits.

- Laboratory Research in cardiovascular disease. Includes the study of how best to analyze clots which are formed (i.e., improve thrombolytic therapy)

- Laboratory Research in transplantation. Transplantation at Deaconess involves several organs including the liver, kidney, and small bowel. Research in this area is aimed at overcoming two major issues: First, how to improve the survival/function of transplanted organs so that the window of opportunity for transplantation from a cadaver is as long as possible. Second, how to reduce or prevent the immune mediated rejection of transplanted organs when a complete tissue-match between donor and recipient is not possible.

- Laboratory research in nephrology. Research to study oxygen deprivation in the tubules of the kidney due to acute venal failure as well as research to compare how different groups of animals such as mammals and fish maintain their salt balance.

- Research in hematology/oncology. Research aimed at identifying which genes are read that should not be read and then interfering with the function of those genes. Also, concentration in research on solid tumors where such events can be more difficult to study than the more commonly studied leukemia and lymphomas with special orientation to tumors that are treatable by combination therapies involving surgery such as cancer to the colon or bladder.

- Research in infectious diseases. Studies to overcome antibiotic resistance where there are unique infectious complications associated with other major diseases such as diabetes.

- Research in neurology/neurochemistry. Research using clinical material from man and animals to establish invitro tissue and organ cultures which can be used to better understand how the nervous system works and how different drugs exert their effects.

- Research in rheumatology. Research dealing with diseases of joints and associated tissues.

Deaconess is committed to maintaining the highest standards of research capabilities commensurate with its position as one of Boston's pre-eminent teaching hospitals.

5. ***Massing.*** The existing Farr Building (Building 4 on Exhibit B) at the center of the main campus is the tallest of the Hospital's buildings (eleven stories) and contains the most significant concentrations of patient beds and diagnostic departments. High volume ambulatory care functions (medical office/exam type functions) and their related parking structures are at the perimeters of the campus, thereby limiting through-traffic within the campus. Buildings along the Riverway are set back from lot lines and are at a lower scale than buildings in the center of campus.

6. ***Traffic Circulation.*** Traffic patterns on the Deaconess campus are illustrated on Exhibit C. Brookline Avenue, Longwood Avenue and the Riverway are the primary vehicular access routes to the campus. Francis Street (two-way), Pilgrim Road (one-way heading south), Joslin Place (one-way entering the campus from Brookline Avenue), Deaconess Road (one-way exiting the campus back onto Brookline Avenue), and Autumn Street (one-way entering the campus from the Riverway) are secondary traffic routes.

As a result of the limited size of the Deaconess campus and the location of major through-streets on the perimeters of campus, the primary function of these secondary traffic routes is to handle local Hospital traffic. The closure of Pilgrim Road

between Brookline Avenue and Longwood Avenue several years ago eliminated a shortcut route for through traffic and further reinforced the status of these secondary routes as a system of internal streets primarily serving Deaconess.

7. *Loading Areas*. The central supply center for the Hospital was formerly located adjacent to Brookline Avenue in the building shown as Building 14 on Exhibit B, between Deaconess Road and Francis Street. This location required delivery trucks to back along Brookline Avenue into the supply center loading area, often resulting in traffic delays. To remedy this situation, the Hospital has relocated its main supply center off-campus to Jamaica Plain. The Hospital now uses a system of decentralized satellite supply areas scattered throughout the campus, stocking these areas as needed with deliveries from the main supply center. These deliveries can be made by smaller vehicles and can be timed to coincide with off-peak traffic hours on Brookline Avenue.

8. *Parking*. The parking capacity provided for on the Deaconess campus is in excess of 1,200 spaces. Parking is not allocated on a building by building basis. Parking garages located on the perimeter of campus at 110 Francis Street (Building 18) and Pilgrim Road (Building 10) accommodate over 1000 cars and account for the bulk of on-campus parking. An outdoor lot adjacent to Harris Hall (Building 12) and a doctors' parking lot behind the Maintenance Building (Building 7) provide

approximately 150 additional spaces. Other parking is available along inner streets and in other locations shown on Exhibit D.

In addition to the on-campus parking, the Hospital owns an off-campus parking facility and subsidizes four off-campus parking facilities operated by the Medical Area Service Company (MASCO), a cooperative agency owned by institutions in the Longwood Medical Area. The Hospital encourages its employees to park in the MASCO lots and to utilize MASCO shuttle buses or other forms of public transportation to and from the Hospital. Deaconess also promotes a variety of other programs designed to encourage employees to utilize alternative forms of transportation including substantial discounts for MBTA passes, van-pooling programs such as Caravan for Commuters, and computerized carpool matching offered by MASCO.

9. *Traffic Volumes*. An analysis of the existing volume of traffic along routes and at intersections in and around the Deaconess campus is set forth in a traffic study dated May 16, 1986, prepared by Vanasse/Hangen, included herewith as Appendix A. The data presented in this study was updated and supplemented by a Transportation Access Plan dated November 6, 1987, prepared by Abend Associates included herewith as Appendix B.

10. *Pedestrian Circulation*. On-campus internal streets provide convenient and effective routes for pedestrian circulation throughout the Deaconess campus. Primary pedestrian entry points are shown on Exhibit C. The entrance to the Farr Building on

Pilgrim Road is the main entrance for inpatients and visitors to the Hospital and is considered the Hospital's front door. This entrance is not visible from Brookline Avenue and fails to provide a clear point of identity for the Hospital. Other major points of entry include the ambulatory care facility at the Lowry Building (Building 19), the new ambulatory care facility in the Kennedy Building (Building 9) and the Meissner Building (Building 16).

11. *Open Space*. Public open space on the Deaconess campus is provided and maintained by the Hospital at Joslin Park which is located between Joslin Place and Deaconess Road. Joslin Park is landscaped with trees and park benches and provides a refreshing park area and inviting entrance to the Deaconess campus. Signage identifies the park as a public open space. The Riverway parkway and park area also bound the Deaconess campus to the west.

12. *Building Utilities*. The heaviest concentration of utility systems (sewer, power, steam and chilled water) serving the campus is under Joslin Park and Pilgrim Road. The layout of utilities is shown on Exhibits E, F and G. The utility infrastructure available to the campus appears to be sufficient to accommodate future development at the Hospital.

C. *Employment.*

Deaconess presently employs an estimated 2,906 persons, comprised of 660 part-time and 2,246 full-time employees. A breakdown of employees by group is provided in Chart 2 below:

Chart 2

Employee Group	Full-Time	Part-Time	Total
Administrative (Secretaries, Billers, Office/Clerical...)	410	107	517
Technical (Med Techs, Pharmacists, Physical Therapists...)	461	138	599
Nursing (Nursing Assist. thru LPN)	90	24	114
Nursing (Staff RN's)	428	191	619
Nursing Management (Supvs, Nurse Mgrs, Directors)	53	13	66
Support (Maint., Bldg. Svcs., Dietary)	193	92	285
Trades (Eng. & Maint.)	16	0	16
Professional (Sr. Techs. Supvs. Mgrs., Administration)	243	41	284
Physicians	119	30	149
Residents	225	0	225
Students (Nursing, Pharmacy, Med. Tech)	8	24	32
TOTAL	2,246	660	2,906

D. *Public Benefits*.

Boston's health care institutions play an integral role in the economy and well-being of the City. Boston enjoys a reputation as a center for higher learning in the areas of science and medicine. Professors, physicians and other medical professionals are attracted to the area because of this reputation. The availability of advanced medical care is an asset that helps to make Boston a desirable city in which to live and work.

The medical community stimulates the local economy in a variety of ways. In addition to providing jobs to thousands of Boston area residents, local hospitals create the need for an entire industry of health care support services and manufacturing products. As these businesses are attracted to the Boston area to be near the ultimate users of their products and services, more job opportunities are created and local tax revenues increase.

Deaconess is an important member of Boston's medical community. Its programs in the areas of cancer, organ transplantation, cardiovascular disease, AIDS and diabetes are among the best in the nation. Especially noteworthy is the leadership role the Hospital has played in providing medical care for women and men with AIDS, many of whom are from the Boston area. The Hospital's reputation can only reflect favorably on the City.

The Hospital contributes revenue directly to the City in the form of linkage payments and payments in lieu of taxes. In connection with the development of its proposed clinical facility (discussed below), Deaconess has agreed to make linkage payments to the City, in excess of $900,000. These funds can be used to subsidize the creation of affordable housing and housing support services or to create job training programs.

Deaconess is also a good neighbor to its surrounding communities. The Hospital has worked with community health centers to address the needs of area community residents. In addition to financial support, the Hospital offers staffing and technical support. Since 1986, residents from Deaconess have seen patients at the Roxbury Comprehensive Community Health Center (RoxComp) every week, and the Hospital has provided assistance in other areas, such as computerizing RoxComp's business office. The Hospital's relationship with the Fenway Community Health Center extends back to 1972, and over the years has included physician time spent at weekly clinics, financial support and assistance in the establishment of a laboratory for the Center. The Hospital has also been involved with the Dimock Community Health Center through the sponsorship of nurse assistant training sessions and more recently through fundraising efforts.

Deaconess contributes to the Boston community in a variety of ways. It helps to enhance the City's image and reputation; it attracts first rate medical professions in the area; it

stimulates the economy; and it contributes at the local level to help address the medical needs of its surrounding community.

III. *THE PLANNING PROCESS.*

The facilities planning process undertaken by New England Deaconess Hospital involves a series of steps designed to create a framework for the allocation of resources for redevelopment at the Hospital. These steps include the following:

- Identify the planning goals and objectives of the Hospital. These objectives will be used to prioritize the needs and development alternatives for the Hospital.
- Identify and assess the external and internal factors which will influence the allocation of available resources. This process involves identifying patient demands and health care trends as well as internal physical, organizational, and programmatic needs and deficiencies.
- Establish a Physical Master Plan as a general framework for future anticipated development.
- Identify specific development projects that will address identified external trends and internal needs and deficiencies.
- Assess the impacts and benefits of future development at the Hospital on the Longwood Medical Area and surrounding neighborhoods.

Deaconess has carefully undertaken this planning process in creating and revising this Master Plan.

IV. PLANNING OBJECTIVES.

The delivery of health care services in today's environment requires an organization capable of meeting the changing needs of patients, professionals, regulating agencies, and the surrounding community. While all of these constituents will influence the Hospital's decisions relating to the allocation of its resources, the ultimate goal of the Hospital is to continue to respond effectively to the needs of its patients while maintaining the institution as one of the foremost specialty referral hospitals in New England. The accomplishment of this goal will require a modern physical plant that is substantial enough to support the Hospital's clinical, research, and educational programs, and attractive enough to provide patient satisfaction, generate pride among Deaconess staff and physicians, and contribute in a positive manner to the synergy of the Longwood Medical Community.

The specific planning goals of the Hospital can be broken down as follows:

(1) To provide a sufficient quantity and quality of space to accommodate change and to improve efficiency.

(2) To provide adequate medical research facilities to maintain its position as a top teaching hospital and support its commitment to the Harvard Medical School.

(3) To create a clear, functional and attractive entry for Hospital patients and visitors and improve the visibility and perception of the Hospital from Brookline Avenue.

(4) To clarify and simplify traffic circulation within departments, buildings and throughout the campus.

(5) To improve the physical quality and attractiveness of this part of the Longwood Medical Area and to relocate the Hospital's existing service loading area off of Brookline Avenue.

(6) To create an overall planning framework to redevelop the Hospital as a more integrated system, with departments properly sized, arranged and located logically with respect to each other.

(7) To accomplish the foregoing in a manner which will recognize the Hospital's role as a part of the Longwood Medical Community so as to enhance the quality of the residential and institutional life within the community.

V. *FACTORS INFLUENCING PLANNING DECISIONS*.

The factors which will drive the Hospital's planning decisions on the future allocation of resources toward development are a combination of external pressures and limitations and internal physical, organizational and programmatic needs and deficiencies. Although all of these factors are interrelated, they are discussed separately below.

A. *External Factors*.

1. Growing Demand. The demand for the Hospital's inpatient clinical services has increased steadily during the past decade and is expected to continue increasing in the future. Patient discharges in 1988 totalled 13,721 and increased to over 14,000 in 1989. The clinical facilities at the Hospital have already fallen behind demand and will have increased difficulty keeping pace with future growth.

As advances in medical technology permit many clinical services to be conducted on an outpatient basis, the demand for ambulatory/outpatient services will grow at an even faster rate than the demand for inpatient services. Outpatient visits at the Hospital, which totalled 75,335 in 1988, increased to over 81,000 in 1989. Deaconess must be prepared to modernize its ambulatory/outpatient facilities if it is to meet this rising demand.

Not only are the numbers of inpatients and outpatients growing, but the range of clinical services being demanded is also expanding. The technology for treating patients is progressing at a dramatic rate. Deaconess is under increasing pressure to make new technologies and innovations available to its patients. Patient rooms, constructed in a different era of health care service, are undersized and ill-suited to accommodate the equipment associated with these new technologies.

Teaching hospitals such as Deaconess are also being asked to expand their commitments to a wider range of medical research and teaching programs. The support facilities for such programs at Deaconess are not adequately equipped to effectively handle these new demands. Moreover, crowded conditions in Hospital rooms hinder primary care training and detract from the residency program. As the teaching of medical professionals takes on greater importance, well designed space for instruction and research will become essential.

2. *Space Limitations*. Available undeveloped space on the Deaconess campus and throughout the Longwood Medical Area is at a premium. It is therefore crucial for Deaconess to make the optimal use of existing land and space.

Deaconess occupies approximately 650,000 gross square feet of on-campus floor space and maintains approximately 489 licensed patient care beds. This represents an average of less than 1330 gross square feet per bed. According to the Bostin Study, this average is substantially below a generally accepted range of 1800

to 2200 gross square feet per bed for a major university-affiliated teaching hospital emphasizing referred tertiary cases, like Deaconess. This deficiency is a function of the dramatic growth in high technology and specialty patient care services, the expansion of the scope of educational programs and medical research which has occurred at Deaconess during the past decade, and the failure of the physical facilities at Deaconess to keep pace.

Deaconess has not added any physical plant for inpatients in over twenty years. The Hospital's facilities have not kept pace with the level of demand or with the level of development of other facilities in the Longwood Medical Area. The existing aggregate floor area ratio of all of Deaconess' buildings to the total land area of the campus is approximately 2.07. This is substantially less than the estimated aggregate floor area ratios of other institutions in the Longwood Medical Area, which generally range between 3.0 and 4.0.

B. Internal Factors.

1. Physical Needs. Deaconess' main hospital facility, the Farr Building, is nearly thirty-five years old. While the Farr Building is physically in good condition, it is unrealistic to expect that it will be able to adapt to the dramatic growth and evolution that has occurred in the health care industry.

The Hospital's other primary inpatient care buildings are the Baker, Palmer and Deaconess Buildings, built in 1934, 1927 and 1907, respectively. The overall design of these buildings is antiquated and the configuration of space and utility systems within them is inadequate to accommodate the personnel, equipment and support services needed to deliver the multi-disciplinary level of care required by patients.

The Hospital's support buildings were also examined closely by the Bostin Study. The Study identified four support buildings on the Deaconess campus as being in such a deteriorated condition that renovation would not be cost effective.

(1) Harris Hall (Building 12), originally constructed in 1913 and currently housing medical and nursing administrative functions;

(2) The Maintenance Building (Building 7), originally constructed in 1959 and housing the maintenance and laundry facilities; and

(3) 306 The Riverway (Building 8), originally constructed in 1928 and currently used as apartments and offices.

(4) The Deaconess Building (Building 6) constructed in 1907 with additional stories added in 1923, the oldest Deaconess Building currently housing patient beds and other diagnostic and treatment services.

The scarcity of undeveloped space on the Deaconess campus and within the Longwood Medical Area makes it imperative that Deaconess coordinate the phased modernization of space with the demolition and replacement of these deteriorated and obsolete buildings.

Housing and parking facilities have also been considered in the Hospital's assessment of its physical plant. The Hospital's

apartment building located at 306 the Riverway provides thirty-seven (37) units of rental housing for the community. The Hospital therefore has no current plans for the creation of new residential units on its campus.

As in almost every other part of Boston, parking on the Hospital's campus is at a premium. However, parking studies done on behalf of the Hospital in the past indicate that the creation of a significant number of new parking spaces on the Deaconess campus would not solve the parking problem and would only exacerbate traffic problems within the Longwood Medical Area.

These studies found that Hospital employees were using a large percentage of the available on-campus parking, thereby decreasing parking availability for patients and visitors and eliminating turnover of spaces during the day. In response to these findings, Deaconess has instituted a system to encourage employees to park in off-campus lots and to utilize available shuttle bus service to the Hospital. Car pooling and public transportation use is also encouraged. The Hospital has an active program of subsidizing MBTA passes for its employees. Through these types of programs, Deaconess has alleviated on-campus parking problems by opening up a greater percentage of on-campus spaces to patients and visitors and by taking advantage of a greater rate of turnover in these spaces.

2. *Organizational and Programmatic Needs*. Organizational and programmatic deficiencies, caused by overcrowded conditions, have hampered the Hospital's ability to efficiently deliver health

care services and provide quality teaching programs. The sharp growth in medical technology and the growth in demand for a wide range of clinical and educational services have placed tremendous pressure on the Hospital's facilities. Doctors, patients and staff have been forced to function in overcrowded space.

In an attempt to ease this pressure, the Hospital has resorted to makeshift and often inefficient dispersions of functions. Programs have been separated into discontiguous units and integrally related functions and departments are often in locations remote from each other. Patients needing ancillary services such as x-rays are often required to be transported between buildings and are subjected to two or more elevator trips. Support facilities, such as outpatient registration and medical records handling, are dispersed throughout campus.

Deaconess has identified several areas where clustering of patients with similar diagnostic problems would be highly beneficial. Clustering allows for a more controlled environment and more efficiency in the delivery of health care services. General space constraints and the lack of available space for labs and other technical support services have severely limited the Hospital's ability to take advantage of such clustering.

Space limitations are adversely affecting the Hospital's ability to introduce technologies/innovations, expand teaching and research commitments, and handle significant increased demand for outpatient services, surgical services, critical care services, cardiology, nutrition support, vascular labs,

orthopedics and other programs. Not only are the Hospital's current clinical programs restrained from further expansion, but Deaconess is also unable to implement many new programs which would be in keeping with its long-term goals.

3. ***Research Space.*** Currently, approximately 225 people work in the Hospital's research space dedicated to medicine, surgery, radiology, pathology and the Joint Center for Radiation Therapy, representing a density of approximately 253 square feet per person. This compares to a target density of 500 net square feet per person established by the Hospital's consultants as the minimum acceptable level. The range for research space used nationally for planning new biomedical research laboratory space extends from 400 to 800 square feet per person. The currently allocation of 253 square feet of space at Deaconess falls well below this level.

Unlike most of the other Longwood Medical Area institutions, which concentrate heavily on biomedical research, Deaconess focusses its research efforts on the application of biomedical knowledge to patient care. The research done at the Hospital seeks to improve the ability of the medical community to diagnose, treat and ultimately prevent disease. Due to the Hospital's concentration on the interface between biomedical science and the care of patients, Deaconess' research programs include a proportionately high representation of researchers who are also active clinicians. These researchers have been hampered

in the performance of their dual roles by the lack of proximity between their laboratory and clinical space.

The need for modernized research space at Deaconess in proximity to its clinical facilities is clear. The Hospital has projected a need for approximately 153,515 square feet of research space by the year 2000, representing an increase above current levels of over 82,000 square feet. This increase in space is not driven by a desire to expand research programs, but rather by a need to provide sufficient space for the types of research already being done at the Hospital. The availability of adequate research facilities is critical to the Hospital's ability to maintain its position as a pre-eminent teaching institution.

The Hospital's ability to successfully bridge basic biomedical study with clinical application will depend upon a modern facility for the care and use of animals. At present, all of the Hospital's animal work is conducted off-campus. The construction of an on-campus facility for animal research is necessary for the Hospital's research commitments.

VI. *THE MASTER PLAN.*

New England Deaconess is aware that it is not physically or financially feasible to address the physical needs of all departments and programs simultaneously. The Hospital must establish priorities for facilities reorganization and redevelopment on the basis of an evaluation of the Hospital's planning goals, the immediacy of the relationship of the identified deficiencies to patient care activities, anticipated trends in the delivery and financing of health care, and the severity of existing deficiencies.

The Deaconess intends to address its needs in a logical and planned manner. Included herewith as Exhibit H (and reproduced at the end of this Section) is a Master Site Plan showing the Hospital's current vision of its pattern of future development. As depicted on this plan, the Hospital anticipates future development in the areas of clinical, research, outpatient and patient support services.

A. *Uses and Density.*

The center of the campus, in the vicinity of the Farr Building extending to Brookline Avenue, will remain the high density diagnostic and patient care use area of the campus. Medical research functions will be concentrated in close proximity to the primary patient care facilities. Future growth

in clinical facilities will be concentrated in the space within the block bounded by Pilgrim Road, Deaconess Road, Brookline Avenue and Francis Street marked as "Clinical" on Exhibit H. Commercial development will occur along Brookline Avenue. Building heights will be lower at the campus edges, especially along the Riverway.

B. Traffic and Parking.

The majority of the existing on-campus parking will be retained. New on-campus parking demands for patients will be accommodated by displacing staff and employee spaces to off-campus locations. Parking and the majority of vehicle traffic will remain at the edges of the site.

C. Entry/Image.

The Master Plan will create a clear and easily identifiable entry off Joslin Park for patients and visitors. Replacement buildings will increase the visibility and accessibility of Deaconess in the Longwood Medical Area. The replacement of the deteriorated commercial block on Brookline Avenue will not only improve the Hospital's image but will also create a visual improvement to all of the Longwood Medical Area.

D. *Pedestrian Circulation.*

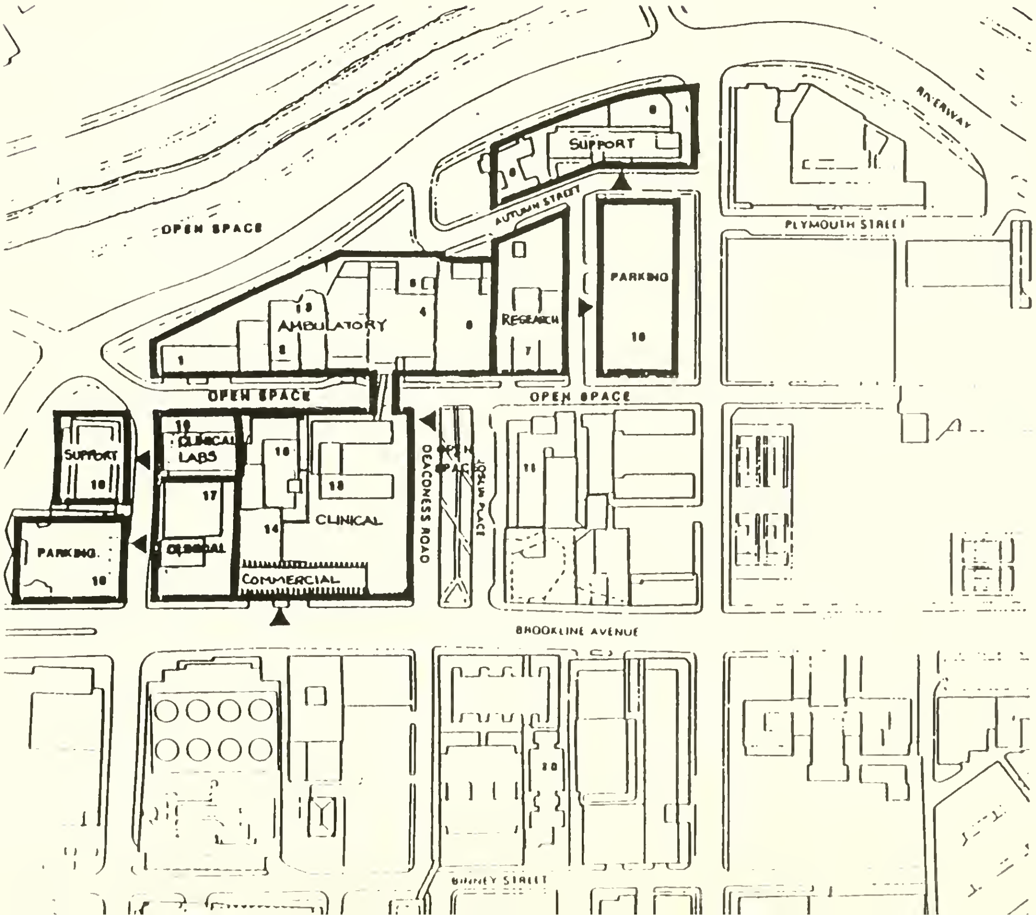
Due to the enclosed nature of the Deaconess campus, the internal streets on the Deaconess campus provide effective pedestrian routes to all of the Deaconess Buildings. Nonetheless, the pedestrian circulation system will be improved. In connection with the new clinical facility (discussed below) the main entrance to the Hospital will be relocated to the area adjacent to Joslin Park. This will enhance the entrance to the Hospital and will also make the park more accessible to patients, visitors and staff as they enter and exit the Hospital. The park is landscaped with benches and plantings and signage will direct pedestrians to the Hospital's new entrance.

Signage throughout the campus will identify Hospital buildings and direct patients and visitors. It is expected that in connection with the new clinical facility (discussed below), the portion of Pilgrim Road between Deaconess Road and Francis Street will be available for limited automotive traffic. This stretch of road, which leads past the Hospital's existing primary care facilities, will become a pedestrian walkway landscaped with benches, lights and plantings. This area and Joslin Park will provide two inviting pedestrian areas adjacent to the Hospital's primary care buildings.

Exhibit II

MASTER SITE PLAN

PROPOSED USE AND OPEN SPACE



■ Building Key

1 PALMER	11 JOSLIN
2 CEMPHER	12 HARRIS
3 BAKER	13 COMMERCIAL
4 FARR	14 STORAGE
5 CHAPEL	15 CHT
6 DEACONESS	16 MEISSNER
7 MAINTENANCE	17 OVERHOLT
8 APARTMENTS	18 PARKING
9 KENNEDY	19 LOWRY
10 PARKING	20 SHIELDS WARREN

NEW ENGLAND DEACONESS HOSPITAL

0 50 150 ft

VII. *SPECIFIC DEVELOPMENT PROJECTS.*

Deaconess has carefully evaluated various development alternatives within the parameters of the Hospital's long-range Master Plan. After careful analysis, the Hospital's development plans revolve around three primary projects: the renovation of the Kennedy Building into an ambulatory care center which was recently completed, the construction of a new clinical facility, and the construction of a new research facility. In addition to these proposals which will upgrade patient care and research facilities, the Hospital has just completed day care space in an existing on-campus building and is developing plans to add support space onto its Computer Building (Building 2).

A. *New Ambulatory Care Facility.*

The Hospital recently completed renovations of the Kennedy Building into a new ambulatory (outpatient) care center. As previously discussed, demand for outpatient services is increasing at an astounding rate. As medical technology advances, more services can be provided on an outpatient, as opposed to an inpatient, basis. To accommodate these increased outpatient visits, the Hospital anticipates adding approximately forty new physicians by 1992. After careful evaluation of its nursing program, the Hospital elected to discontinue its school of nursing which was formerly located in the Kennedy Building

(Building 9) and to renovate the interior of the Kennedy Building to convert it to a new ambulatory care facility.

The Kennedy Building is located within an H-2 Zoning District. It is approximately seventy-seven feet in height and contains approximately 85,000 square feet of gross floor area. The current floor area ratio of the building is approximately 3.03. Because the renovations to the building were confined to the interior, none of these dimensions were altered in a significant way.

The construction cost of the renovation of the Kennedy Building was approximately $3,900,000. Construction began in June, 1989, and was completed in the late spring of 1990. The renovation of the Kennedy Building project generated approximately seventy-five construction jobs, but is not expected to create a net increase in permanent employment at the Kennedy Building.

The renovation of the Kennedy Building is not expected to result in the addition of new staff. The professional and technical staff of the nursing school has been replaced by a staff with different skills servicing the ambulatory care facility. The School of Nursing formerly operated on a predominantly 9:00 a.m. to 5:00 p.m. basis with the bulk of students arriving during the morning peak hour and departing during the evening peak hour. In contrast, experience shows that the highest volume of traffic is generated at ambulatory care facilities between 10:00 a.m. and 3:00 p.m. It is estimated that

the ambulatory care facility will generate twenty patient trips per hour between these hours. Parking spaces in the adjacent Pilgrim Road Garage have been set aside to accommodate these patient trips. This reduces Hospital employee parking in the garage, which in combination with the elimination of student traffic, should significantly reduce peak hour traffic volumes.

B. *Day Care.*

The Hospital has just established a day care program capable of providing care to fifty-eight children. Approximately 3,370 square feet of space within the Hospital's Maintenance facility (Building No. 7) has been renovated to accommodate this program at an estimated development cost of $350,000. Long term future development plans could require relocation of this day care space into the basement of the Palmer Building (Building 1) or elsewhere on the Deaconess campus in connection with construction of the new Research Facility at the site of the Maintenance Building (See Section D below).

C. *New Clinical Facility.*

Deaconess proposes to construct a new patient care facility to be located at 25 Deaconess Road, the current site of Harris Hall (Building 12). The new clinical facility will function primarily as an extension of the existing Farr Building clinical facility. It is anticipated that the new clinical facility will

contain approximately 235,000 gross square feet in floor area. It will be located primarily in an H-2 zoning district, although a portion of it adjacent to Brookline Avenue will be within an L-1 zoning district. The floor area ratio of the facility is expected to approximately 4.5 within the H-2 zoning district and approximately 4.6 within the L-1 Zoning District.

The new clinical facility will be connected to the Farr Building by glass-enclosed, elevated passageways spanning Pilgrim Road at levels 3 through 5 of the new facility above grade and by a tunnel at the basement level. The glass-enclosed, elevated passageways will be stacked one atop the other to minimize visual obstruction and will allow for the circulation of staff, patients and equipment between the Farr Building and the new clinical facility. The new clinical facility will be able to utilize the existing elevator core and support services within the Farr Building due to access created by these passageways.

The construction of the elevated passageways will allow the portion of Pilgrim Road between Deaconess Road and Francis Street to remain open in accordance with discussions between the Hospital and the Boston Redevelopment Authority. Pilgrim Road is an internal street within the Deaconess campus that services primarily local Deaconess traffic. This portion of Pilgrim Road will be paved and landscaped and maintained as a private way for public use. Sufficient clearance between grade and the lowest passageway will be provided for the passage of fire trucks and other emergency vehicles.

In conjunction with the construction of the new clinical facility and the glass enclosed, elevated passageways spanning Pilgrim Road, the Hospital will also add a new entrance and elevator core to the Farr Building adjacent to Pilgrim Road. The new clinical facility will also include a loading area off of Brookline Avenue with sufficient room to allow for trucks to pull off of Brookline Avenue before backing into the loading bays in order to avoid tying up traffic. An ambulance entrance will be constructed on the Pilgrim Road side of the facility, adjacent to the area of the elevated passageways.

The total project cost for the new clinical facility is expected to be approximately $124,500,000. It will generate approximately 200 construction jobs. Construction is expected to commence in April of 1992 and should be completed by mid-1995. As previously discussed, the Hospital has agreed to make linkage payments to the City in excess of $900,000 in connection with construction of the new facility.

Generally, diagnostic and treatment functions will be upgraded and relocated into the new clinical facility. Approximately 108 intensive care and medical/surgical beds will be located in the new facility. With the exception of inpatient beds on the top levels of the Farr Building, space within the Baker, Deaconess, Palmer and Farr Buildings will be devoted primarily to ambulatory care functions including outpatient and patient visit offices, clinics, rehabilitation units, therapy centers and a pharmacy.

The purpose of the new clinical facility is to alleviate existing overcrowded conditions in the Hospital's primary care facilities. The new clinical facility will provide the necessary space for the efficient realignment and operation of the Hospital's existing programs and departments. It is not intended as an expansion of the Hospital's programs and therefore will not require a net increase in Hospital personnel or create the need for a significant amount of increased parking or other support functions.

The proposed new clinical facility will address several of the most pressing deficiencies and needs identified through the Hospital's planning process. The new facility will permit the modernization and consolidation of critical clinical programs. Moreover, the relocation of programs from other buildings to the new facility will allow for the better utilization of space in those buildings. The new facility will provide for the following benefits:

(1) A consolidated single-level surgical suite equipped with adequate post-operative and support areas;

(2) A consolidated single-level radiology suite equipped with adequate utility services and support, storage and teaching areas;

(3) The relocation of inpatient medical-surgical beds from undersized rooms in the older Baker and Palmer Buildings to new adequately sized rooms;

(4) More space in replacement medical-surgical and intensive care rooms for modern monitoring and life support equipment, and better accommodation of teaching and residency programs;

(5) Relocation within the Farr Building of the diagnostic treatment facility near the radiology department, the vascular lab and pulmonary function lab to allow for the delivery of joint clinical services;

(6) More effective clustering of departments and patients and increased efficiency in the delivery of health care services;

(7) Easing of overcrowded conditions in storage areas, nursing stations and other support areas;

(8) Potential for future construction of medical research space; and

(9) A new, more visible and inviting main entrance to the Hospital on Deaconess Road adjacent to Joslin Park.

D. *The New Research Facility*.

As discussed above, there is a critical need on the Deaconess campus for upgraded research space to be located in close proximity to the Hospital's clinical activities. The Hospital has identified a need for over 82,000 net square feet (135,000 gross square feet) of additional research space by the year 2000.

The Hospital intends to address a major portion of this need through the construction of a research facility in the current location of the Maintenance Building and doctor's parking area. The Maintenance Building will be demolished to make way for the research facility. The day care space within the Maintenance Building will be relocated on-campus, possibly to the Palmer Building. The small amount of doctor's parking behind the Laundry Maintenance Building will be relocated into the existing

parking garage on Longwood Avenue by displacing other hospital employees to off-campus parking.

Construction of the research facility is expected to begin at the end of 1992 and be completed with 18 to 24 months. The total cost of construction is estimated to be $47 to 50 million. Construction of the research facility will generate an estimated seventy-five (75) construction jobs.

The new research facility will be six stories in height and will contain approximately 79,200 net square feet of research space (132,000 gross square feet). The existing CRI Building (Building 15) which is outdated will be demolished. The net gain in usable research space to the Hospital will be approximately 58,000 net square feet. Almost 30,000 square feet of this space will be devoted to an upgraded animal research facility which will require little if any additional staff. The balance of the space will be used to reallocate space for programs formerly located in the CRI Building and to alleviate existing overcrowding and fragmentation of research on and off-campus. Consequently, the net number of new permanent employees required by the new research facility is expected to be less than fifty.

The new research facility will be ideally located near the Hospital's clinical programs. This will accommodate the Hospital's focus on patient care research and will enable the research scientists to effectively perform their dual roles as researchers and clinicians. The new research facility will greatly alleviate the Hospital's research space problems;

however, additional space will still be necessary to meet the Hospital's projected needs for the year 2000. The Hospital will continue to use space off-campus following completion of the new research facility to help satisfy those needs.

E. *Shields Warren Radiation Laboratory*.

The Hospital is completing an addition on the fifth floor of the Shields Warren Radiation Laboratory, consisting of 2,500 square feet of space. This is in addition to the 2,900 square feet of space which was constructed several years ago. Radiology research is done in the existing space, but because of the need for further similar research, it has become necessary to complete construction of the floor.

The new radiology research facility at the Shields Warren Radiation Laboratory enables investigations of several important problems in medicine, including cancer, organ transplantation, and vascular disease. The facility includes laboratory space for the growth and analysis of a variety of human tumor cell types, particularly gliomas. Another critical research program in the new space is seeking to develop improved organ preservation techniques, allowing greater flexibility and efficiency during transplantation. Finally, the research facility permits new investigations of vascular disease and atherosclerosis. The facility contains a research angiography system which greatly enhances the Hospital's vascular research capabilities.

F. *Computer Building Addition.*

The construction of the new clinical facility will necessitate the demolition of Harris Hall, which currently contains management offices and clinical support functions. The Hospital gave serious consideration to the construction of a new six-story, 52,000 square foot, support facility in the location of the doctors' parking area behind the Maintenance Building, as a means of addressing its support space needs. After careful evaluation, however, the Hospital has opted instead to compensate for its loss of support space by constructing three additional floors atop the Computer Building (Building 2) and by leasing three floors in the new MASCO Building on Longwood Avenue for additional support space. This alternative will address the Hospital's need for support space while maximizing flexibility and minimizing impacts.

Each of the three floors to be added to the Computer Building will contain approximately 4,100 square feet each while an additional fourth level will act as a bridge between the Baker Building (Building 3) and Palmer Building (Building 1). Construction of this small addition to the Computer Building is expected to begin in March of 1991 and be completed by September of 1991 in time for relocation of the functions of Harris Hall prior to the start of the new clinical facility. This additional space in the Computer Building, along with space to be leased by the Hospital in the new MASCO Building on Longwood Avenue will

help to alleviate the Hospital's shortage of support space created by the demolition of Harris Hall.

G. *Renovation of Existing Clinical Space.*

The realignment of the Hospital's programs and departments that will be made possible by the new clinical facility will also be accompanied by the upgrading of the Hospital's existing clinical space. Over 200,000 gross square feet of space in the Palmer, Baker, Farr and Deaconess Buildings will be available for re-utilization due to the relocation of radiology, surgery, intensive care and medical/surgical beds and other functions into the new clinical facility.

Deaconess anticipates spending approximately $150,000,000 on the renovations. The renovations, which will be entirely internal, will update the space within these four buildings and address a variety of deficiencies. The space will be renovated primarily to accommodate ambulatory care functions such as outpatient visits, clinics, rehabilitation units, therapy centers and a pharmacy. The renovated space will enable the Hospital to meet the increased demand for ambulatory care services and to reorganize existing haphazard layouts and fragmented departments within the buildings.

VIII. ENVIRONMENTAL IMPACTS AND MITIGATION.

The New England Deaconess campus is a self-contained cluster of streets and buildings, essentially isolated from the surrounding community. The campus does not border on any residential neighborhoods and is surrounded largely by other medical uses. Major transportation routes run along the perimeters of the campus and do not penetrate campus boundaries. Secondary streets within the campus carry primarily local Deaconess traffic.

Because of the internalized nature of the Deaconess campus, impacts from construction activity within the campus do not directly affect the surrounding community. The redevelopment of the Hospital's facilities through the specific development projects described above will not displace housing uses and will not negatively impact local residential neighborhoods or the Longwood Medical Area.

The development projects described in this Master Plan are not designed to expand Hospital programs, but rather are intended to replace and modernize existing deficient facilities. The Hospital does not anticipate an increase in employment or total staffing above levels that have existed at the Hospital during the past three years. Consequently, the Hospital's proposed projects will not create any additional demand for housing or services in the area.

Nonetheless, the Hospital recognizes that sound planning must include a careful assessment of the potential impacts on surrounding communities of proposed developments. In Massachusetts, development proposals of any significant size or scope are subject to environmental reviews under the Massachusetts Environmental Policy Act ("MEPA"). MEPA requires identification and discussion of project impacts and alternative development scenarios and provides a forum for public review and comment at an early stage in the planning process. The development proposals discussed in this Master Plan will be subject to MEPA. The Hospital has carefully analyzed potential impacts and considered possible alternatives.

In considering development alternatives, the Hospital has been constrained by several factors. Off-campus alternatives are extremely limited due to the scarcity of available space, the high costs of such space, and the need to locate patient care functions near existing facilities. One off-campus option that the Hospital has pursued is a new building being constructed by MASCO on the Temple Israel property across Longwood Avenue from the Hospital. The Hospital has leased approximately 25,000 gross square feet of space in this building to be used for doctor's offices and clinical support functions. The Hospital expects to take occupancy of its space in the MASCO building in January, 1992.

Notwithstanding the MASCO project, the general unavailability of space in the Longwood Medical Area requires

that the Hospital focus its development plans on its existing campus. Since on-campus space is also scarce, obsolete facilities must be demolished before new facilities are constructed. Because this modernization process can occur only gradually over time, new facilities must be located and planned to function in concert with existing facilities. To function effectively, the Hospital's new facilities must be woven into the existing fabric of the Hospital's campus.

This section of the Master Plan analyzes the potential impacts that the Hospital's major proposed developments will have on their environment. It discusses the operating and urban design implications that the projects will have and considers possible mitigation measures that could be implemented by the Hospital. It also includes a discussion of the construction impacts of each of the projects and the mitigation measures that will be implemented to minimize those impacts, and also considers the cumulative construction impacts of the Hospital's proposals with other construction activities in the area.

A. Operational Impacts and Mitigation.

1. Proposed Clinical Facility.

The largest of the Hospital's proposed development projects, the proposed new clinical facility, has completed the MEPA review process. However, even before the MEPA process was underway, the Hospital had begun carefully considering available

alternatives to arrive at the proposed development program for the new clinical facility.

In considering alternatives for the location of a clinical facility, Deaconess identified the following site selection criteria in an effort to assure that the new clinical facility would address existing deficiencies and function with the Farr Building as an integrated unit.

- Large Footprint: Each of the radiology and surgery departments must be relocated to a larger space on a single floor, thus requiring a building with a sufficiently large footprint.
- Growth: The site must afford the potential for growth of major clinical and medical research facilities in order to keep pace advancing demand.
- Proximity to Farr Building: The site of the new clinical facility must be functionally adjacent to the existing Farr Building. Neither building will be equipped to function as a separate unit and each will rely on the other for essential equipment, personnel, transport of patients and other support services.

The proposed site of the new facility at the current location of Harris Hall is the only site on the Deaconess campus that will satisfy all of these criteria. The site will allow for a large footprint, the building will be constructed to accommodate future vertical expansion, and its location immediately across Pilgrim Road from the Farr Building combined with the glass-enclosed, elevated passageways between the two buildings will provide for the necessary circulation of personnel and support services between the two buildings.

Because the size and massing of the proposed new clinical facility will be consistent with surrounding structures, it is

not anticipated that it will create significant wind or shadow impacts on the surrounding area. The building will be sufficiently set back from Joslin Park to avoid any increased shadow in the park area.

As detailed in the Abend Transportation Access Plan, attached as Appendix B, because the proposed new clinical facility is intended to alleviate existing overcrowded conditions and is not intended to accommodate any significant expansion in the programs provided by the Hospital, the proposed new facility is not expected to result in a substantial increase in traffic in the area. The levels of service at major intersections near the Deaconess campus will therefore not be significantly affected. Although surface parking spaces adjacent to Harris Hall will be displaced in connection with the project, these spaces will be relocated to one or more possible alternative locations on campus such as the current site of the service station on Francis Street or existing on-campus parking facilities.

Although the operation of the new clinical facility is not expected to significantly increase traffic in the area, the Hospital and the City have devised a bold mitigation strategy to attempt to improve the existing congested traffic situation on Brookline Avenue. Coincidentally with limiting access to general traffic circulation on the portion of Pilgrim Road between Deaconess Road and Francis Street, the Hospital would grant the City an easement over a portion of the Hospital's land along Brookline Avenue. This easement would be used for the addition

of a third travel lane southbound on Brookline Avenue between Deaconess Road and Francis Street. If constructed, this additional lane would ease traffic congestion along Brookline Avenue and would tie into an already existing third travel lane on Brookline Avenue between Francis Street and the Riverway. As specified in the Hospital's agreement with the City, construction of the third travel lane on Brookline Avenue would precede the limiting of access onto Pilgrim Road, thereby assuring that the flow of traffic on Pilgrim Road would not be affected until the additional travel lane on Brookline Avenue was open for travel.

2. *Ambulatory Care Facility.*

The new ambulatory care facility will also not adversely impact the surrounding community. Because the size and exterior features of the Kennedy Building were not altered, there has been no change in the scale or massing of the campus and no increase in shadow or wind impacts. The Kennedy Building is located on Autumn Street, which is an internal street within the Deaconess campus servicing primarily local Deaconess traffic. As described in the Abend Transportation Access Plan, attached as Appendix B, the ambulatory care facility will generate approximately twenty outpatient trips per hour primarily at off-peak times. Deaconess has adopted a strategy to set aside parking spaces in the Pilgrim Road Garage adjacent to the Kennedy Building as necessary to accommodate these outpatient trips. This eliminates Hospital employee spaces in the garage, which should reduce commuter trips to and from the campus at peak hour times. The closing of the

school of nursing also eliminates student trips to and from the Kennedy Building which formerly occurred primarily at peak travel times. The cumulative effect of these factors is an anticipated decrease in peak hour traffic volumes in the immediate area of the Deaconess campus.

The renovation of the Kennedy Building was a move by the Hospital to maximize its utilization of existing resources. After careful consideration, the Hospital determined that the School of Nursing within the Kennedy Building was no longer an essential function. A new ambulatory care unit was badly needed and the Kennedy Building was of sufficient size to accommodate such a unit. Rather than constructing new space, the Hospital converted existing space to respond to a more urgent need. The new ambulatory care facility will enable the Hospital to meet the expanding demand for outpatient services and allowed for the consolidation of its ambulatory support services.

3. Research Facility.

The proposed new research facility, because of its modest size and internal location, will not create any significant impacts beyond the boundaries of the Deaconess campus. Because the size of the Building is consistent with surrounding structures, shadow and wind impacts should not be significant. The research facility will house existing research programs and staff which will be displaced by the demolition of the CRI Building or which will be relocated from other overcrowded Hospital facilities. A significant portion of the space within

this building will be for an upgraded animal research facility. Because this new research building will be primarily an upgrade of space for existing programs, it is not expected to generate a significant increase in the number of the Hospital's permanent employees, and consequently is not expected to generate a significant volume of new traffic. Although the research facility will displace approximately fifty doctors' parking spaces, the Hospital will relocate these spaces on-campus by displacing some employee parking to off-campus locations.

An alternative location for construction of the research facility at which was considered by the Hospital was the construction of a research center along Brookline Avenue at the corner of Francis Street, in the current location of a gasoline service station. This building would have been approximately ninety (90) feet in height and would have been an extremely visible presence in the Longwood Medical Area. After careful study, the Hospital has determined that the proposal for the facility at the location of the Maintenance Building is a more desirable alternative for a variety of reasons. The height of the building will be substantially shorter at the site, and the location of the building internally on the Deaconess campus will reduce any potential impacts of the building on the surrounding areas. The location of this building in close proximity to the entrance to the new clinical facility will also provide the researchers within this building with easy access to the

Hospital's clinical programs and departments without adding to congestion on Brookline Avenue.

4. *Computer Building Addition.*

The three-story addition to the Computer Building will have little if any impact on its surroundings. Even after the addition of these stories, the Computer Building will be shorter in height than the adjacent Palmer and Baker Buildings. The addition will contain only approximately 13,000 square feet of space in total, the top floor of which will act as a bridge between the Palmer and Baker Buildings. This additional space will contain relocated support functions and therefore is not expected to create additional employees or add to traffic.

B. *Urban Design.*

The visual and urban design implications of each of the proposed projects have been taken into account. The scale and massing of the proposed clinical facility is consistent with other clinical buildings within the center of Deaconess' main campus. The location of the proposed facility is also consistent with the planning objective of clustering high density, clinical patient case uses in the center of campus. Visually, the new clinical facility will improve the appearance of the retail block along Brookline Avenue and will enhance the overall image of the Hospital to the public.

The exterior of the ambulatory care building has not been changed and therefore the basic characteristics of the building and its compatibility with surrounding structures has not been affected. Landscaped public sidewalks and signage identify the building and provide an inviting public access to the building.

The new research facility will continue the Hospital's use of construction materials which are consistent with the character of other campus buildings. The building will be of a scale which is consistent with surrounding buildings and the pedestrian use of Autumn Street. Landscaping will be provided to the exterior of the building and tree-lined sidewalks will be maintained.

The Hospital's proposed development projects will improve the pedestrian quality of the Hospital's campus. Upgraded buildings that are appropriate to the scale and character of Boston will replace older Hospital buildings. This will also improve the character of the nearby Riverway. Landscaping improvements proposed for Joslin Park, the limited-access portion of Pilgrim Road and elsewhere on the campus will create a more inviting atmosphere for pedestrians. Signage for pedestrian traffic and more visible entries will also assist pedestrian and vehicular traffic flows.

C. *Construction Impacts and Mitigation.*

A thorough analysis of construction impacts must be conducted as part of the MEPA and BRA review processes before any

project gets final approval to commence construction. In anticipation of this analysis and as part of its master planning process, the Hospital has already attempted to identify any potential impacts of its proposed construction projects.

Construction impacts from the proposed projects are not expected to be significant. The primary impacts will be construction traffic and construction noise. With proper management, these impacts can be kept to a minimum.

The largest of the proposed projects, the new clinical facility, will create the largest number of construction management issues. However, because there is no residential area in the vicinity of the new facility, noise and traffic impacts on residential neighborhoods will not be a problem. The increase in traffic volumes on Brookline Avenue due to construction vehicles and construction activity occurring adjacent to Brookline Avenue should be offset by the proposed addition of a southbound lane on Brookline Avenue. Construction traffic will be managed to minimize the use of main roads by construction vehicles during peak volume times. Deliveries to the construction site will occur at off peak times and construction workers will park in off-campus lots. Dust from demolition and construction activities will be minimized using conventional wetting and other construction techniques.

Pedestrian traffic on Brookline Avenue will be rerouted around the construction site and will be managed to minimize disruptions. Staging will be placed in non-pedestrian areas

whenever possible. No staging will be placed in Joslin Park and no direct obstruction of the park will occur due to the construction of the new facility.

Construction noise and traffic impacts from the new research facility and the additional floors to the Computer Building will be at a smaller scale than those of the new clinical facility and will be confined to the interior of the Hospital's campus. Neither project is located adjacent to a major travel route. Construction can be managed to minimize noise and dust, and to route construction traffic to and from the site during off-peak hours.

D. Cumulative Construction Impacts.

Deaconess has taken into account the potential overlap in construction periods of the Hospital's various project proposals. The renovation of the Kennedy Building and the construction of the day care space have been completed. The addition of floors on the Computer Building is expected to commence in March of 1991 and be completed by September of the same year. None of these projects will overlap. The construction of an additional entrance and elevator core onto the front of the Farr Building could start as early as late 1991 in preparation for construction of the new clinical facility in the spring of 1992. Renovations of space within the Farr, Baker, Palmer and Deaconess Buildings will not commence until completion of the clinical facility.

Construction of the new research facility, which is expected to begin in late 1992, will overlap with construction of the new clinical facility.

Deaconess recognizes the need to carefully manage and coordinate the construction and traffic impacts of the new clinical facility and the new research facility projects. The Hospital will employ the same construction manager on both projects who will monitor and oversee them as if they were a single project. The proximity of the two sites to each other should enable the construction manager to perform this dual task effectively.

The use of the same construction manager for both projects should assist in the management of construction traffic to avoid peak travel periods and in arranging for the delivery of materials to the site. The simultaneous construction of the two projects may even present opportunities to take advantage of economics of scale in arranging for deliveries of construction materials, storing of staging and other materials, and other areas of the project construction. Ultimately, the period of disruption caused by the construction activity will be shortened by constructing the projects simultaneously rather than successively.

The impacts of other projects in the Longwood Medical Area and their relationship to the Hospital's proposals have also been considered. Construction of the MASCO office building, retail block and garage at the corner of Longwood Avenue and Pilgram

commencement of construction of the Hospital's new clinical facility or research facility.

IX. PUBLIC REVIEW PROCESS.

The Deaconess campus is not located within an urban renewal area and the Hospital has no existing cooperation agreements with the Boston Redevelopment Authority for the redevelopment of its facilities. Nonetheless, every construction project proposed by the Hospital is subject to a wide range of state and local scrutiny.

At the state level, a thorough environmental review of all proposed projects is conducted through the MEPA process. In addition, any proposed capital expenditure of $7.5 million or more for the construction of a new health care facility or the substantial rehabilitation of an existing facility is subject to extensive review by the State Department of Public Health through the Determination of Need process. This review process ensures that there is a public need for the proposed facility. In making its determination as to the need for a proposed facility, the Department of Public Health considers the financial, physical and programmatic aspects of the project.

On a local level, there are several layers of public review. Large project proposals which qualify as Development Impact Projects under the Boston Zoning Code, such as the new clinical facility, are subject to extensive design review by the Boston Redevelopment Authority. Moreover, because the Deaconess campus is located in an institutional overlay district under the

Boston Zoning Code, virtually all hospital-related uses under the Zoning Code require the issuance of conditional use permits by the Boston Board of Appeal. The Boston Redevelopment Authority also typically reviews a project in an advisory capacity to the Board of Appeal. Consequently, any development project proposed by the Hospital would be reviewed by the Board of Appeal, and in almost every case, the Boston Redevelopment Authority. The Board of Appeal review and frequently the Boston Redevelopment Authority reviews include public hearings.

Less formal, but no less meaningful, reviews of projects occur at the neighborhood level. Deaconess is a responsible member of the Longwood Medical Community and MASCO, and realizes the importance of local community input. The Hospital has in recent years met on several occasions with members of the Mission Hill PZAC, Fenway neighborhood groups, and other Hospital neighbors. The Hospital is planning additional meetings during the upcoming year to keep its neighbors updated on its Facilities Master Plan and specific building proposals as they are developed.

X. *PUBLIC BENEFITS.*

The redevelopment of the Hospital's facilities will generate direct and indirect benefits to the Hospital, the surrounding community and the City of Boston as a whole. The physical improvements to the Hospital's campus and the commercial block along Brookline Avenue will improve the functionality and appearance of the Longwood Medical Area. Existing deteriorated commercial space along Brookline Avenue will be demolished and replaced with modern commercial space.

The Hospital's development proposals will also improve the quality of the pedestrian travel environment. The relocation of the Hospital's main entrance to Deaconess Road adjacent to Joslin Park will improve the surrounding context of the park and the public's perception of the Hospital. In addition, the discontinued portion of Pilgrim Road between Deaconess Road and Francis Street will be landscaped with plantings and benches and converted to a pedestrian walkway.

The Hospital's Facilities Master Plan could also help to ease traffic congestion in the Longwood Medical Area. Hospital employees are being encouraged to park off-campus and to utilize shuttle service or other forms of public transportation to and from the Hospital. The effect of this policy, combined with the

closure of the school of nursing, is anticipated to be a net reduction in peak hour vehicle trips to the Deaconess campus.

As previously discussed, the Hospital and the City intend to add a third travel lane southbound on Brookline Avenue adjacent to the new clinical facility. The impacts of this measure on traffic congestion on Brookline Avenue could be felt not only in the area of the Deaconess campus, but throughout the Longwood Medical Area.

The Hospital's proposed development projects will also provide substantial economic benefits and opportunities to the Longwood Medical Area and the City of Boston as a whole. Spaces in the new day care facility will be available to residents of nearby communities. Construction activities will create jobs for area residents. The Hospital expects to pay over $900,000 in linkage funds to the City. These funds can be targeted toward the creation of affordable housing and housing support services, such as community spaces and day care. Jobs linkage funds can be used to establish job training programs for area residents to teach skills necessary for employment opportunities being created at Deaconess and other area hospitals. The Hospital has proposed to members of the Mission Hill neighborhood that a portion of the linkage funds be targeted for programs to benefit residents of that neighborhood. The Hospital will work with neighbors and neighborhood schools to develop specifics of a job training program.

The specific development proposals described in this Master Facilities Plan will help to ensure the Hospital's continued ability to deliver first-rate health care service. The Hospital has a world-renowned reputation for medical research in such critical areas as AIDS, cancer and diabetes. The location of a health care and medical research institution of such high caliber in the immediate vicinity is a valuable resource for residents of the Boston area. It stimulates growth and creates job opportunities in the medical field and in the many support industries that service medical institutions. A hospital of Deaconess' stature attracts quality professionals and medical personnel into the area. It enhances the reputation of the City of Boston as a modern and sophisticated city and a center for higher learning and research.

As described earlier in this Master Plan, the Hospital has taken an active role in bringing affordable health care to surrounding communities, and has played an integral part in Boston's medical community at large. The projects described in this Master Plan will enable the Hospital to continue in these roles and to address the medical needs of Boston area residents into the twenty-first century.

XI. CONCLUSION.

New England Deaconess Hospital's Master Plan attempts to anticipate the Hospital's direction over the next five to ten years; however, preliminary planning for the period well beyond that horizon has already begun. The Hospital will continue to re-evaluate its needs and resources in an ongoing effort to maintain its status as a primary referral and teaching medical institution. The Hospital will update and resubmit this master plan no later than nine years after this submission. The Hospital is prepared to do its part in contributing to the improvement of conditions within the Longwood Medical Area and in responding to the needs of the local communities.

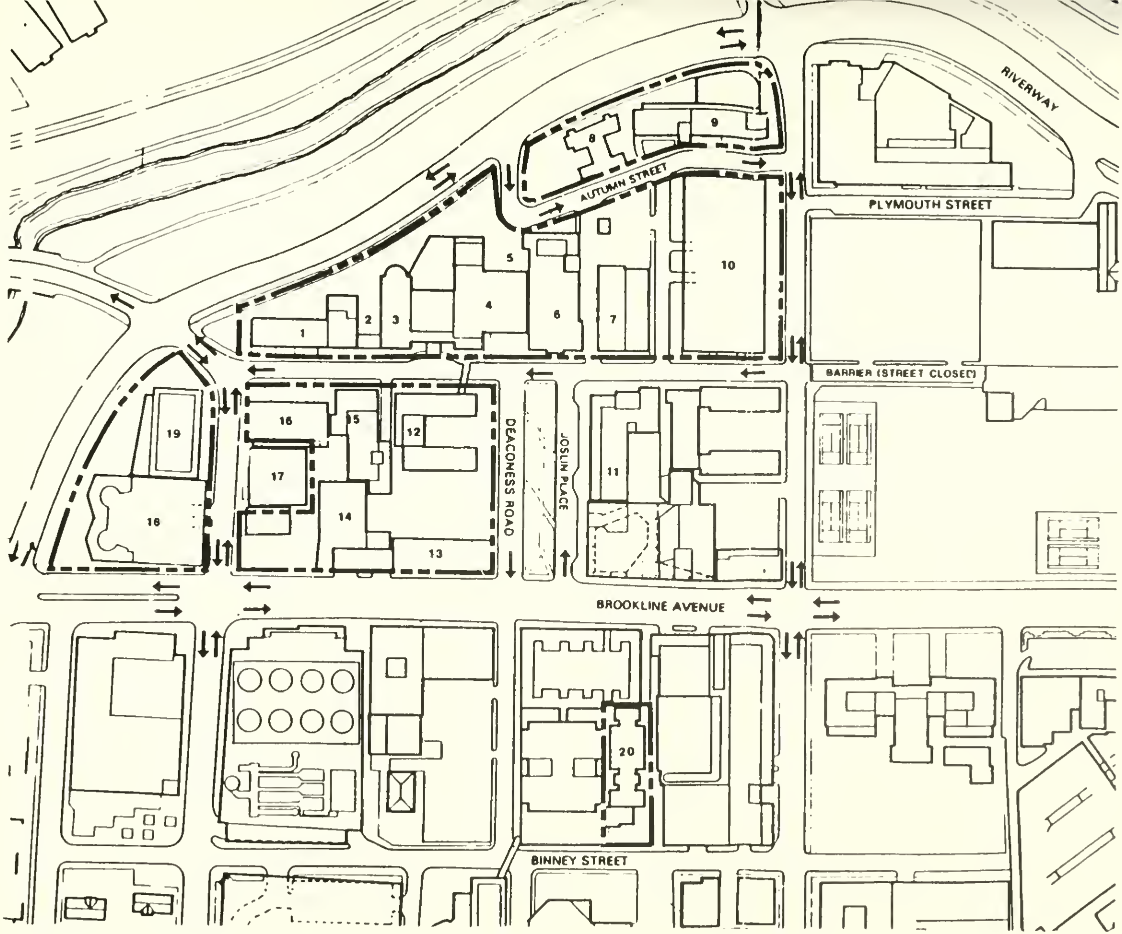
EXHIBITS

Exhibit A

SITE PLAN

N.E.D.H. PROPERTY

AND TRAFFIC DIRECTIONS (EXISTING)



Building Key

- 1 PALMER
- 2 COMPUTER
- 3 BAKER
- 4 FARR
- 5 CHAPEL
- 6 DEACONESS
- 7 MAINTENANCE
- 8 RIVERWAY
- 9 KENNEDY
- 10 PARKING
- 11 JOSLIN
- 12 HARRIS
- 13 COMMERCIAL
- 14 STORAGE
- 15 C.R.I
- 16 MEISSNER
- 17 OVERHOLT
- 18 PARKING
- 19 LOWRY
- 20 SHIELDS WARREN

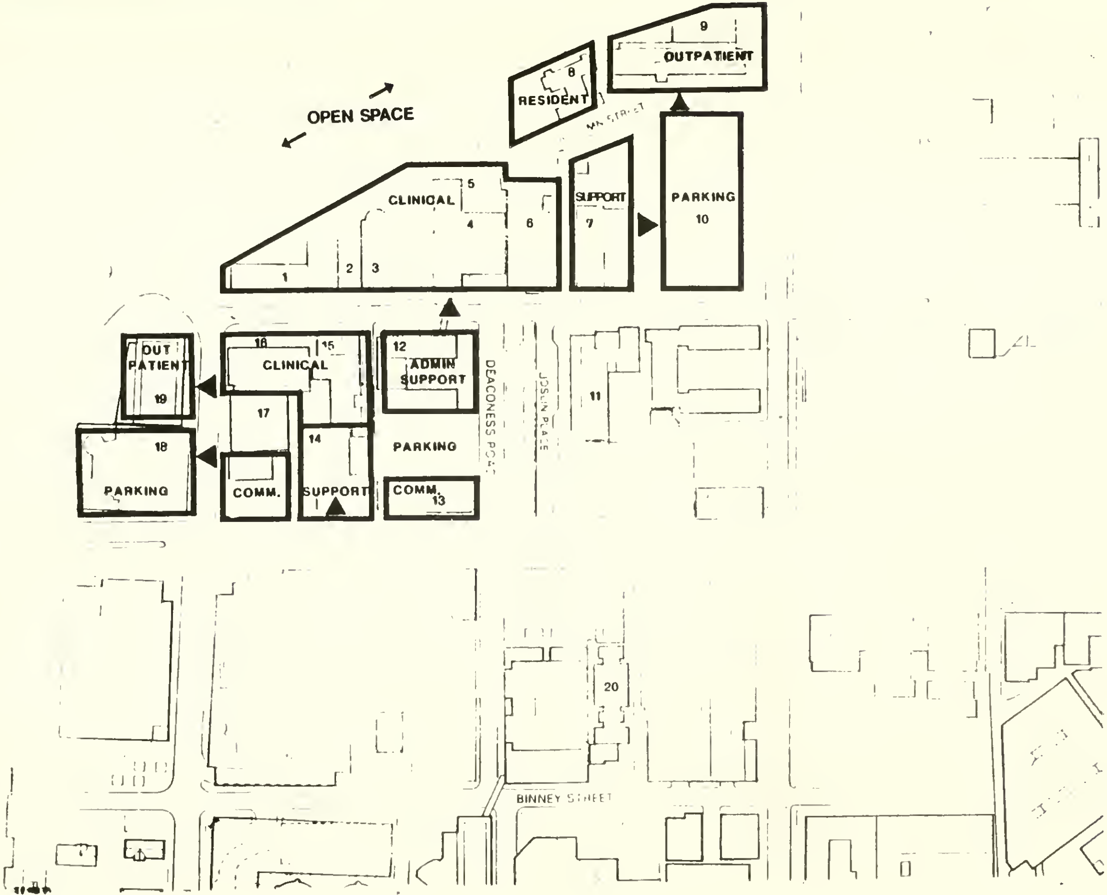
NEW ENGLAND DEACONESS HOSPIT

PAYETTE ASSOCIATES/M. BOSTIN ASSOCIA

0 50 150ft.

Exhibit R

EXISTING USE SITE PLAN



■ Building Key

1 PALMER
2 COMPUTER
3 BAKER
4 FARR
5 CHAPEL
6 DEACONESS
7 MAINTENANCE
8 RIVERWAY
9 KENNEDY
10 PARKING
11 JOSLIN
12 HARRIS
13 COMMERCIAL
14 STORAGE
15 C R I
16 MEISSNER
17 OVERHOLT
18 PARKING
19 LOWRY
20 SHIELDS WARREN

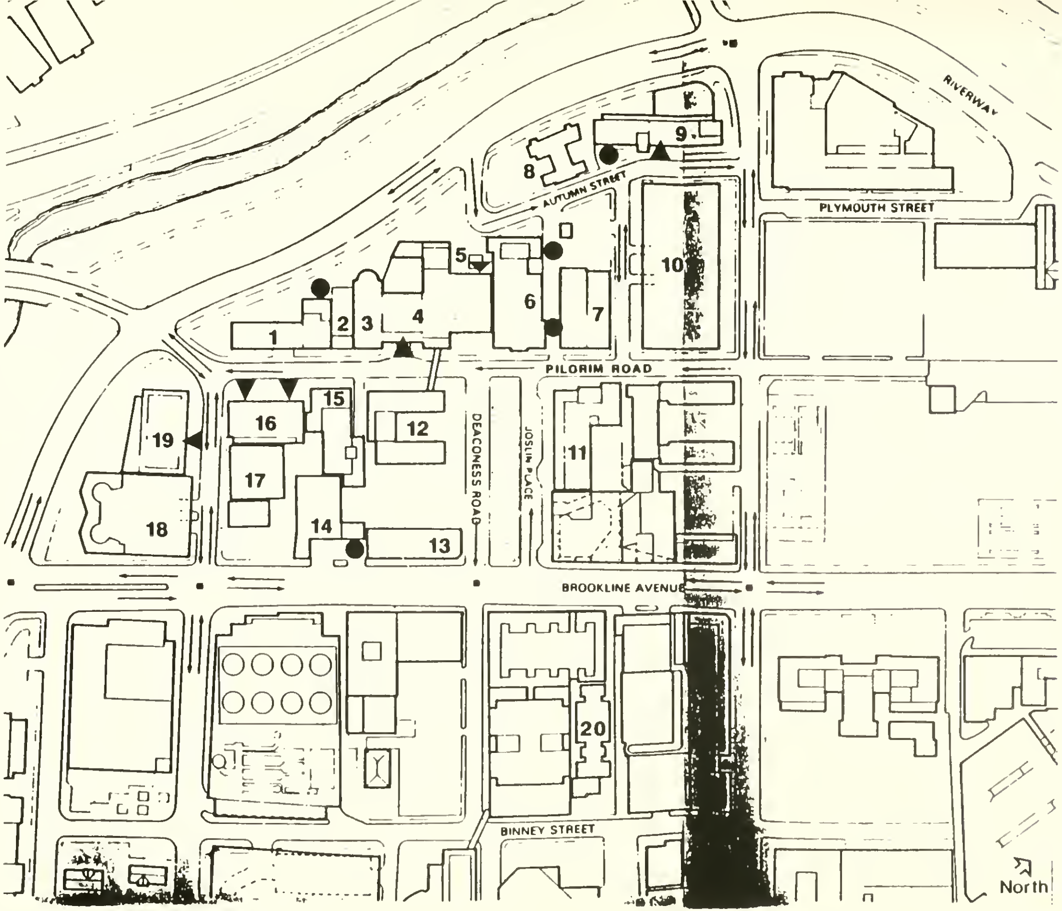
NEW ENGLAND DEACONESS HOSPITAL

PAYETTE ASSOCIATES/M. BOSTIN ASSOCIATE

0 50 150ft.

Exhibit C

Site Circulation



● Delivery/Service

▲ Primary Pedestrian Entry

◭ Secondary Pedestrian Entry

▣ Traffic Lights

■ Building Key

1 PALMER
2 COMPUTER
3 BAKER
4 FARR
5 CHAPEL
6 DEACONESS
7 MAINTENANCE
8 APARTMENTS
9 KENNEDY
10 PARKING
11 JOSLIN
12 HARRIS
13 COMMERCIAL
14 STORAGE
15 C R I
16 MEISSNER
17 OVERHOLT
18 PARKING
19 LOWRY
20 SHIELDS WARREN

□

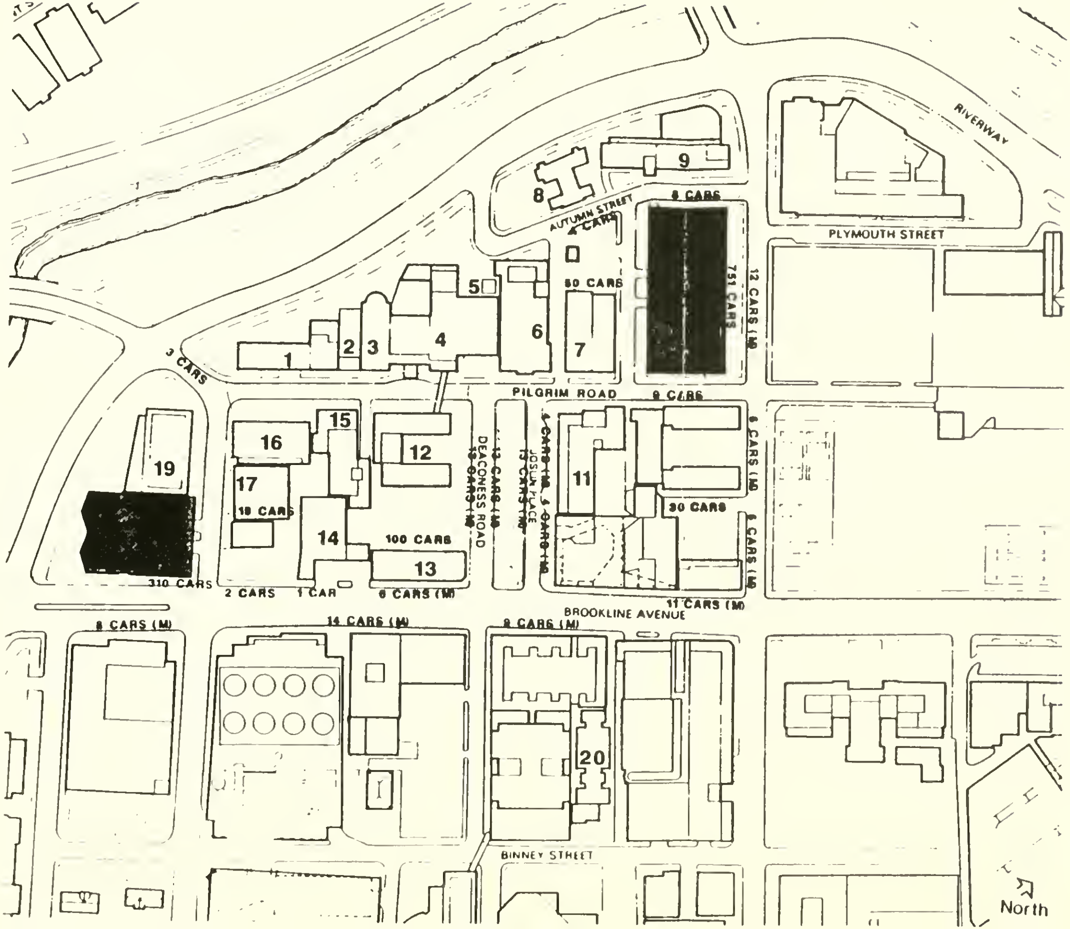
PAYETTE ASSOCIATES/M. BOSTIN ASSOCIATES

0 50 150ft.

2.2.6

Exhibit D

Parking



☐ On Grade Parking

■ Parking Garage

(M) Metered

■ Building Key

1 PALMER
2 COMPUTER
3 BAKER
4 FARR
5 CHAPEL
6 DEACONESS
7 MAINTENANCE
8 APARTMENTS
9 KENNEDY
10 PARKING
11 JOSLIN
12 HARRIS
13 COMMERCIAL
14 STORAGE
15 C R I
16 MEISSNER
17 OVERHOLT
18 PARKING
19 LOWRY
20 SHIELDS WARREN

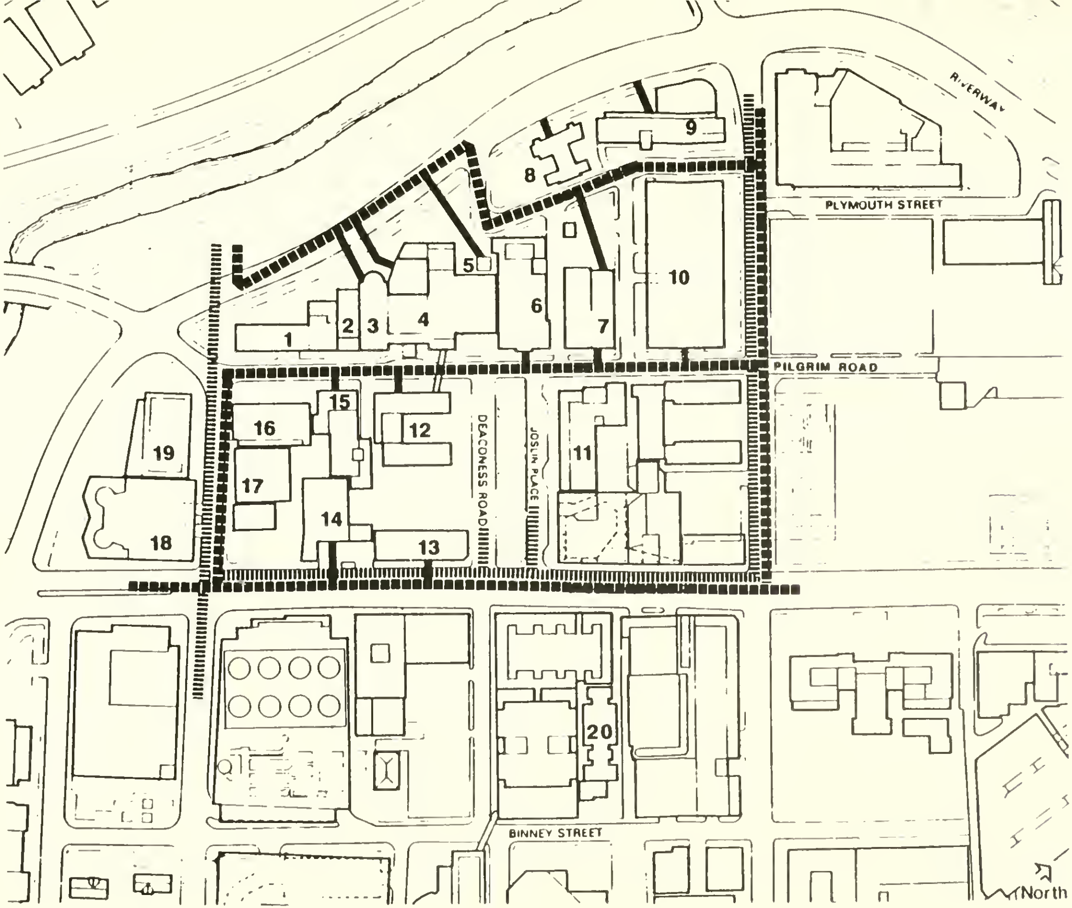
☐

PAYETTE ASSOCIATES/M. BOSTIN ASSOCIATES

0 50 150ft

Exhibit E

Sewer System



▥ Old System

■ More Recent System

■ Building Key

- 1 PALMER
- 2 COMPUTER
- 3 BAKER
- 4 FARR
- 5 CHAPEL
- 6 DEACONESS
- 7 MAINTENANCE
- 8 APARTMENTS
- 9 KENNEDY
- 10 PARKING
- 11 JOSLIN
- 12 HARRIS
- 13 COMMERCIAL
- 14 STORAGE
- 15 C R I
- 16 MEISSNER
- 17 OVERHOLT
- 18 PARKING
- 19 LOWRY
- 20 SHIELDS WARREN

☐

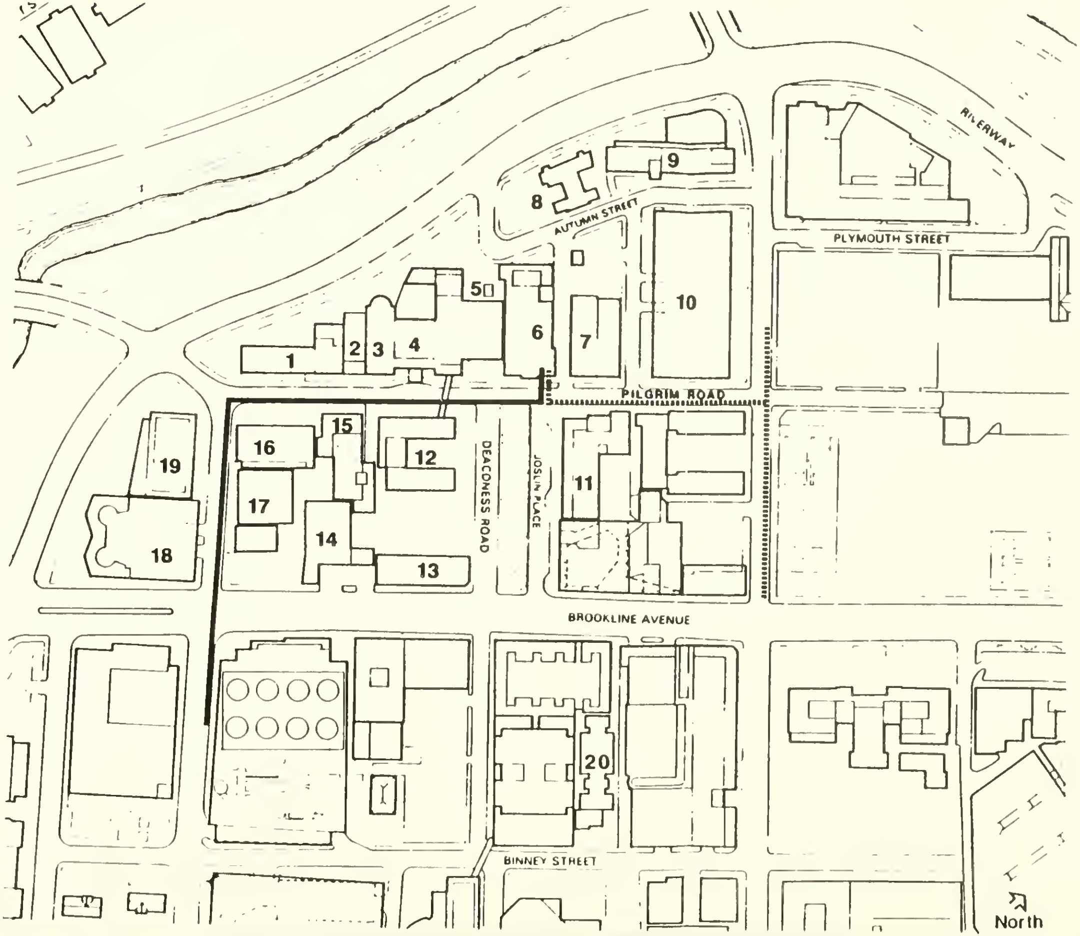
PAYETTE ASSOCIATES/M. BOSTIN ASSOCIATES

0 50 150ft.

2.2.12

Exhibit F

Utility Distribution



▬ Future 15KV MATEP Electrical Service

▨ Present 15KV Edison Electrical Service

■ Building Key

1 PALMER	11 JOSLIN
2 COMPUTER	12 HARRIS
3 BAKER	13 COMMERCIAL
4 FARR	14 STORAGE
5 CHAPEL	15 C R I
6 DEACONESS	16 MEISSNER
7 MAINTENANCE	17 OVERHOLT
8 APARTMENTS	18 PARKING
9 KENNEDY	19 LOWRY
10 PARKING	20 SHIELDS WARREN

□

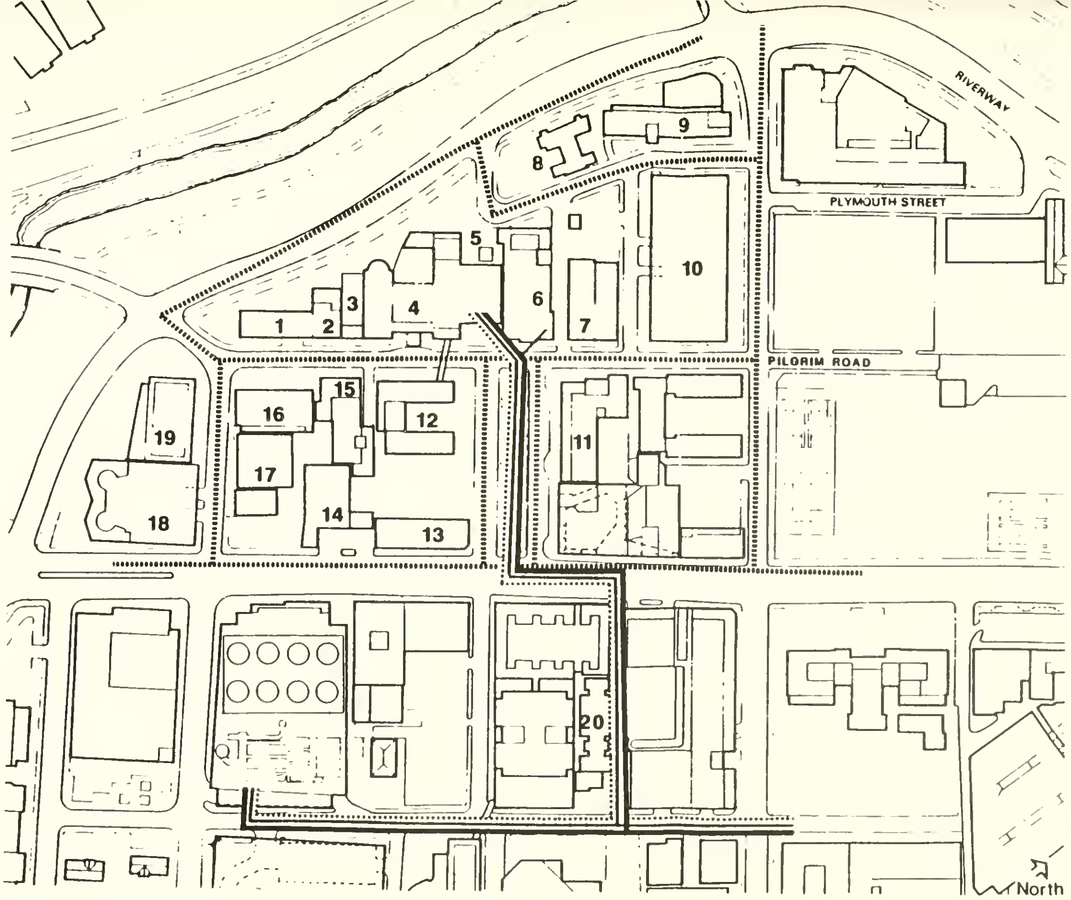
PAYETTE ASSOCIATES/M. BOSTIN ASSOCIATES

0 50 150ft.

2.2.13

Exhibit G

Utility Distribution



⋯ Water Distribution

▬ Chilled Water

═ Steam

⋯ Oxygen

■ Building Key

1 PALMER	11 JOSLIN
2 COMPUTER	12 HARRIS
3 BAKER	13 COMMERCIAL
4 FARR	14 STORAGE
5 CHAPEL	15 C R I
6 DEACONESS	16 MEISSNER
7 MAINTENANCE	17 OVERHOLT
8 APARTMENTS	18 PARKING
9 KENNEDY	19 LOWRY
10 PARKING	20 SHIELDS WARREN

☐

PAYETTE ASSOCIATES/M. BOSTIN ASSOCIATES

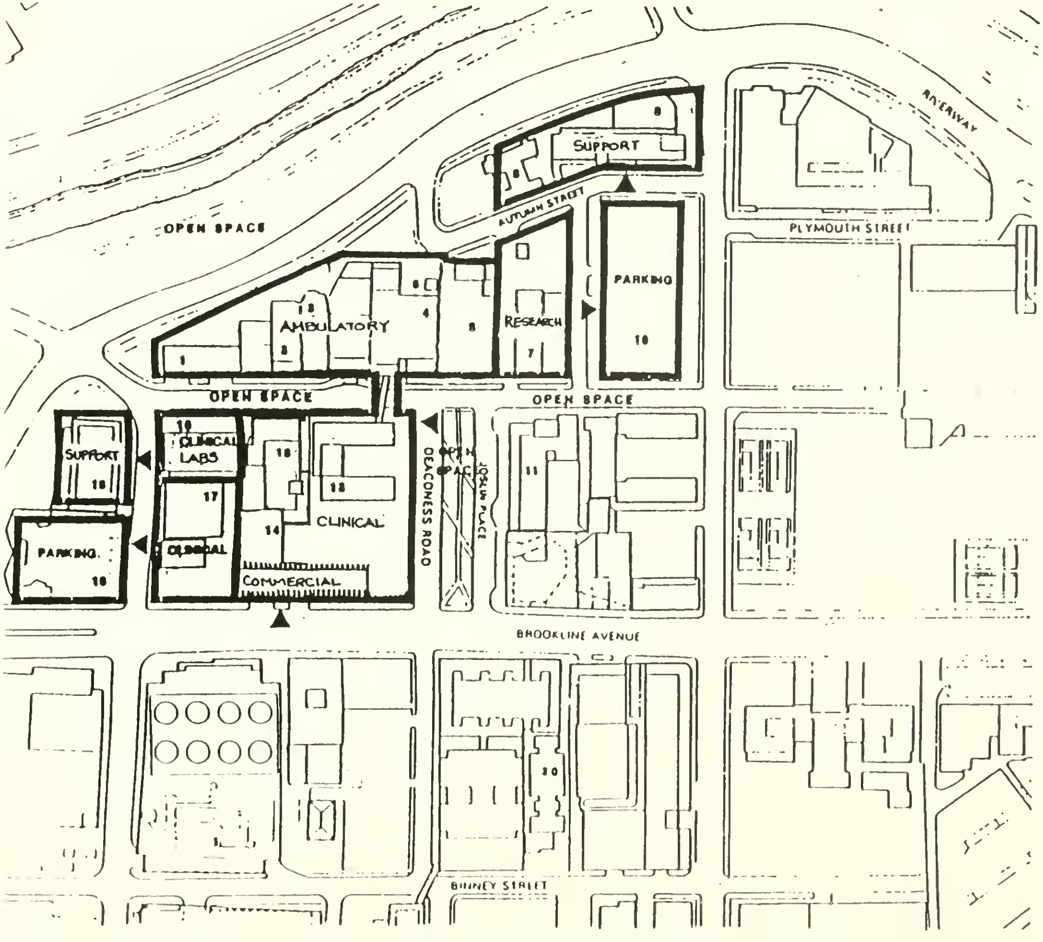
0 50 150ft.

2.2.14

Exhibit II

MASTER SITE PLAN

PROPOSED USE AND OPEN SPACE



■ Building Key

1 PALMER	11 JOSLIN
2 COMPUTER	12 HARRIS
3 BAKER	13 COMMERCIAL
4 FARR	14 STORAGE
5 CHAPEL	15 CHS
6 DEACONESS	16 MEISSNER
7 MAINTENANCE	17 OVERHOLT
8 APARTMENTS	18 PARKING
9 KENNEDY	19 LOWRY
10 PARKING	20 SHIELDS WARREN

NEW ENGLAND DEACONESS HOSPITAL

0 50 150 ft.

APPENDIX A

Memorandum

APPENDIX A

To: Mr. Gary Lahey, Principal
Payette Associates
40 Isabella Street
Boston, MA

Date: May 16, 1986

Ref: 1518

From: Vanasse/Hangen
60 Birmingham Parkway
Boston, MA 02135

Re: New England Deaconess Hospital - Proposed Patient Care Facility Replacement

Introduction

The New England Deaconess Hospital (NEDH) has proposed the construction of a new building which would be located adjacent to existing hospital facilities and require the closure of a portion of Pilgrim Road. NEDH is located in Boston's Longwood Medical Area (LMA) in a triangular area bounded by Riverway, Longwood Avenue and Brookline Avenue. Pilgrim Road functions as a relatively minor local street in the network and it primarily serves to provide direct access to NEDH and its main patient entrance which is located just west of Deaconess Road. In order to quantify the impacts of the proposed closure, a series of detailed traffic observations were conducted including mechanical recorder counts, manual turning movement counts and a brief origin - destination survey. The following sections of this report describe the technical approach and detail the findings of the analysis.

Study Area

The boundaries defined for this study of the proposed closure of Pilgrim Road are Riverway on the north and west, Brookline Avenue on the south and Longwood Avenue on the east. Within this study area are several additional roadways including:

Pilgrim Road
Deaconess Road
Joslin Place
Autumn Street
Francis Street
NEDH Garage Access Road
Alley between Deaconess and Maintenance Buildings

Brookline Avenue, Riverway and Longwood Avenue all function as major arterial roadways carrying daily volumes in excess of 9,000 vehicles per day (vpd).

1518/586/tm

Date: May 16, 1986
Ref: 1518

The other roadways in the study area all function as collector roadways by providing local access to adjacent land uses and to a lesser degree, they carry only a limited amount of regional and through traffic.

Several of the smaller roadways in the study area are posted as one way streets. These roadway segments are:

Deaconess Road - one way eastbound between Pilgrim Road and Brookline Ave.
Joslin Place - one way westbound
Autumn Street - one way northbound
Pilgrim Road - one way westbound (between Longwood Avenue and Francis Street only)

Pilgrim Road itself is approximately 25 feet wide on the one one way westbound section near Deaconess Road. Drivers arriving at the existing main entrance in the Fair Building use a small drop off loop which has been constructed on the north side of Pilgrim Road, just west of Deaconess Road.

Two major NEDH parking facilities are located in the study area: (1) the 10 Francis Garage - 310 spaces, and (2) the NEDH garage adjacent to Longwood Avenue and Pilgrim Road - 751 spaces. Several other small parking lots are also located in the study area, in addition a limited amount of on-street parking on Brookline Avenue, Deaconess Road, Joslin Place, Autumn Street and Pilgrim Road near the NEDH garage.

On going Development in the LMA

There are several on-going building projects currently under construction in the LMA including the following:

- Brigham & Womens ASB II Building & 240 space garage - Francis Street
- Dana-Farber addition - Brookline Avenue
- Children's Hospital, Blackfan Project - Bed replacement, Longwood Avenue
- Harvard University Teaching Facility - Longwood Avenue
- Galleria expansion at Longwood/Brookline Avenues

In addition to these projects, MASCO has initiated discussions for a development on the site of the Temple Israel parking lot. At this point however, the project is only in its conceptual planning stages.

1518/586/trm

Data Collection

A detailed traffic counting program was conducted in the section of the LMA adjacent to the Deaconess Hospital. Included were both manual peak period turning movement observations conducted by NEDH Staff as well as mechanical recorder counts. Additionally, a one hour origin-destination survey was conducted to aid in the identification of Pilgrim Road travel patterns. The purpose of this effort was to identify the major travel patterns in the study area and to quantify the usage level of Pilgrim Road.

Because there is a considerable amount of traffic volume data available from previous Vanasse/Hangen studies, the new data collection effort focused on roadways which have not been recently counted. Counts were taken by NEDH Staff and adjusted manually by Vanasse/Hangen Staff. The following table summarizes the locations which were counted manually as part of this study:

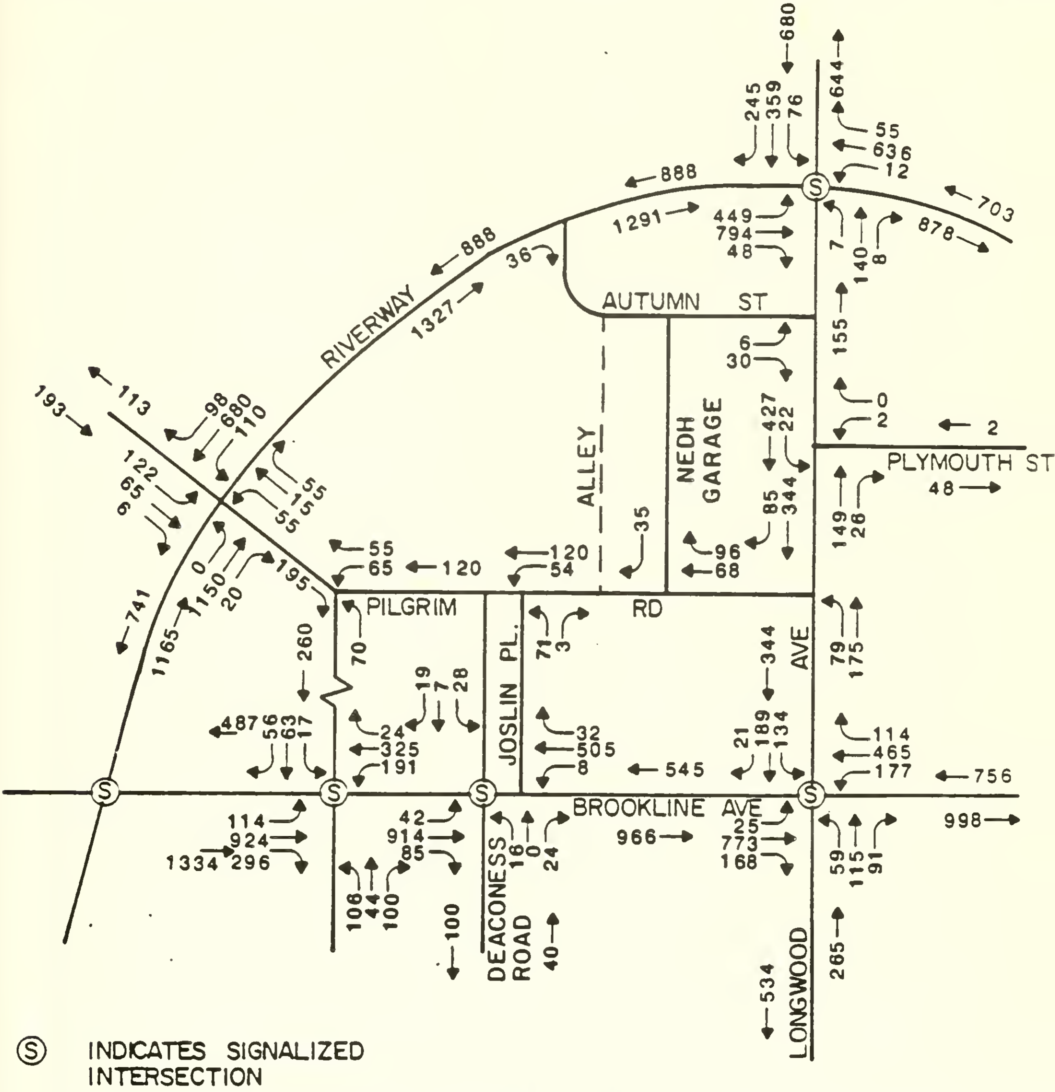
Table 1
Traffic Data Collection Program

Manual Turning Movement Locations (AM and PM peak periods)

1. Riverway/Francis Street
2. Pilgrim Road/Francis Street
3. Pilgrim Road/Deaconess Road/Joslin Place
4. Brookline Avenue/Deaconess Road/Joslin Place
5. Pilgrim Road/NEDH Garage Access Road
6. Pilgrim Road/Longwood Avenue

In addition, a mechanical counting program yielded several peak period counts that were used to check those taken manually.

This new data, was combined with previously available traffic data to produce Figures 1 and 2. The figures define the existing AM and PM peak period traffic flow patterns in the study area. Table 2 summarizes the estimated daily traffic volume information for this study, along with a summary of peak period traffic volumes.



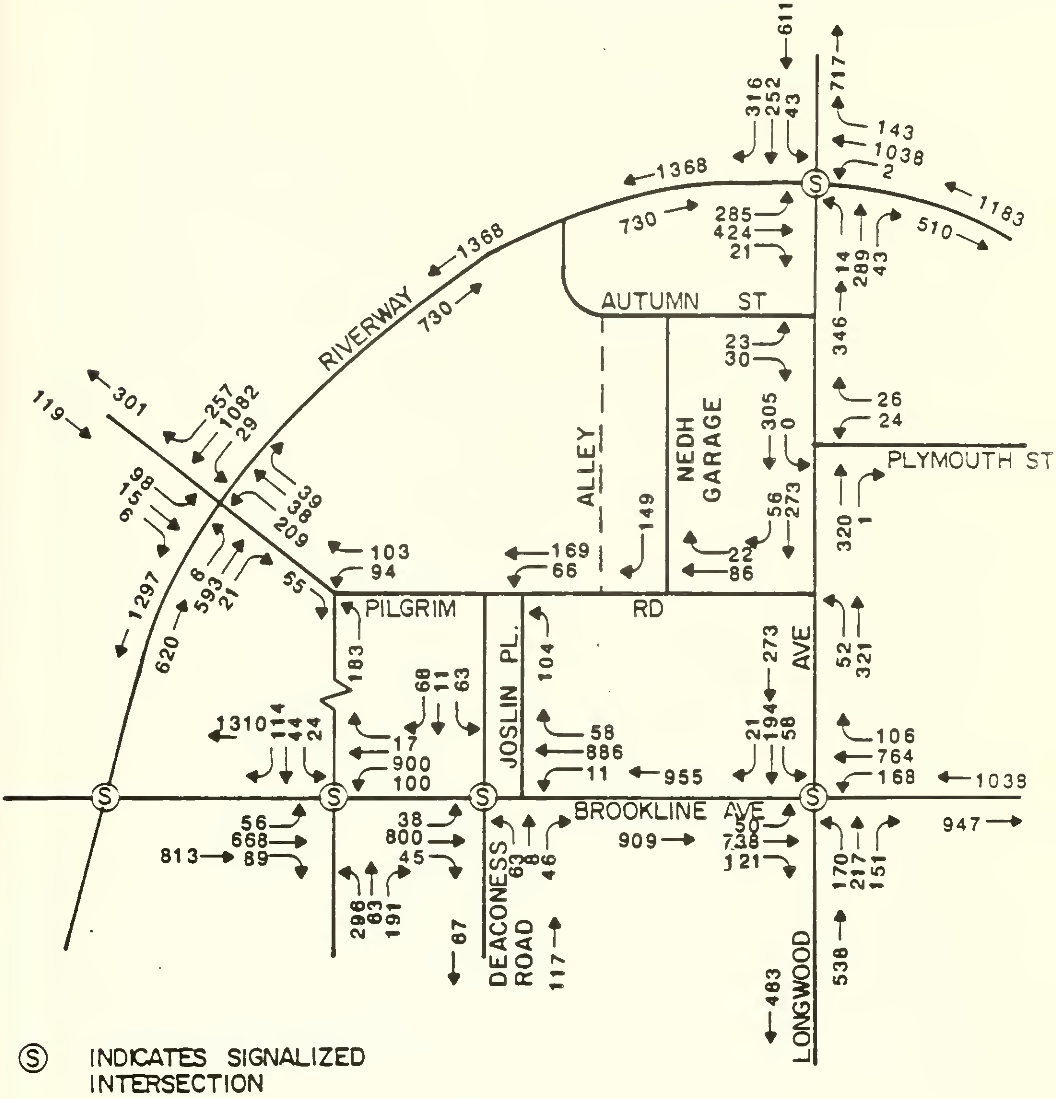
NOTE: Based primarily on volumes measured 4/85 and 5/86

Vanasse/Hangen
Consulting Engineers & Planners
60 Birmingham Parkway Boston MA 02135

Existing A.M. Peak Period Volumes

Not to Scale

Fig. 1



Ⓢ INDICATES SIGNALIZED INTERSECTION

NOTE: Based primarily on volumes measured 4/85 and 5/86

Vanasse/Hangen
Consulting Engineers & Planners
60 Birmingham Parkway Boston MA 02135

Not to Scale

Existing P.M. Peak Period Volumes

Fig. 2

Table 2
Daily Traffic Volume summary

Location	ESTIMATED ADT*	AM Peak Hour** Volume	PM Peak Hour** Volume
Pilgrim Road just east of Joslin Place	2,700	177	235
Pilgrim Road east of Francis Street	2,100	120	197
Deaconess Road north of Brookline Avenue	1,300	54	142
Joslin Place north of Brookline Avenue	1,200	74	104
Francis Street between Pilgrim Rd & Riverway	3,700	320	351
Longwood Avenue between Binney & Blackfan Sts.	14,588***	999	1,025
Longwood Avenue between Pilgrim Rd & Brookline Ave.	9,000	598	646
Brookline Avenue north of Longwood Avenue	29,293***	1,754	1,985

* Average Daily Traffic - Estimate based on peak period turn volumes presented in Figures 1 and 2, except where *** indicates a different source.

** AM and PM Peak Volumes are reported from Figures 1 and 2. 7:30-8:30 AM and 4:00-5:00 PM represent the peak volume periods indicated in Figures 1 and 2.

*** September, 1983 data

1518/586/tm

A review of the data reveals several interesting findings. Probably of greatest interest are the volumes measured on Pilgrim Road itself, on the section proposed to be closed between Deaconess Road and Francis Street. On a daily basis, it is estimated that 2,100 vehicles per day (vpd) travel on this section. Peak hour volumes were found to be 120 and 197 vehicles during the AM and PM peak periods respectively. Obviously, these volumes are quite low in comparison to Brookline Avenue, the nearest adjacent parallel roadway which carries 1700 - 2000 vehicles per hour (vph) during the same periods.

Based on the volume measurements, it appears that during the morning peak, Pilgrim Road functions almost solely to provide direct access to adjacent institutions and parking with the NEDH garage being the prime generator of trips along the roadway. Through traffic traveling over the section to be closed is quite low and is estimated to be in the range of 25 - 50 vehicles.

The situation is quite similar during the afternoon peak, although the volumes are higher. It appears the the NEDH garage is again the major generator of Pilgrim Road traffic. During the afternoon, it appears that some drivers utilize Pilgrim Road as a southbound bypass of Brookline Avenue. Based on the counts presented in Figure 2, it is estimated that 25 - 50 vehicles on the section of Pilgrim Road to be closed are through vehicles.

Usage of Francis Street to enter or cross the Riverway traffic stream was found to be relatively high particularly during the PM peak when 286 vehicles were observed. The bulk of the vehicles using this roadway segment come from Francis Street; 103 were observed approaching from Pilgrim Road.

Origin - Destination Survey

In order to gather additional information on travel patterns along Pilgrim Road, an origin-destination survey was conducted during a one hour period in the afternoon peak when many drivers are exiting the area.

A total of 36 drivers were interviewed on Pilgrim Road at a point just west of Deaconess Road, near the drop off loop in front of the Deaconess Hospital's main entrance. Based on an afternoon peak period volume of approximately 195 vehicles, this represents an 18 percent sample of drivers using this roadway.

The results were quite interesting — of the 36 interviews conducted, 31 drivers (or 86%) indicated that they had at least one trip end at the Deaconess or the Joslin Diabetes Center. Table 2 summarizes the findings:

1518/586/trm

Date: May 16, 1986
Ref: 1518

Table 2
Origin-Destination Survey Results

Origins	
Deaconess Garage	10
Joslin Diabetes Center	3
Deaconess Hospital	2
Boston Locations	11
Other Communities	10
Total	36

Destinations	
Deaconess Garage	6
Deaconess Hospital	10
Boston Locations	5
Other Communities	15
Total	36

These findings, combined with the results of the traffic count observations clearly indicate the predominance of local Deaconess oriented traffic on Pilgrim Road. Of the surveys conducted, only 14 percent of the drivers could be classified as through vehicles - that is those who don't have a trip end at an institution abutting Pilgrim Road. These findings support the estimates of through traffic developed in the previous section of this memorandum.

Analysis of the Impact of Closing a Portion of Pilgrim Road

There is precedent for closing Pilgrim Road, in fact a section north of Longwood Avenue was closed several years ago and has been absorbed by the Winsor School. Similarly, Children's Hospital recently modified the street pattern around its Blackfan Building by closing Blackfan Street and Children's Way to through traffic.

Based on the results of the traffic counts, it does not appear that the proposed closure would significantly affect traffic flow in the LMA. Based on current usage levels during the busiest period of the day, fewer than 200 vehicles would be rerouted. The potential closing is enhanced by two key points:

1. Most of the drivers on Pilgrim Road are attracted to the area by NEDH and are not through drivers, and

2. Pilgrim Road is currently one way and the proposed closure will have a lesser impact than if the street carried two way traffic.

A significant portion of the traffic now using Pilgrim Road turns left onto Francis Street in order to reach the 10 Francis Garage or Brookline Avenue. These drivers would now be forced to exit onto Brookline Avenue via Deaconess Road, resulting in a small increase in delay at this signal. NEDH traffic now exiting Pilgrim Road to Francis Street would also be reduced, creating safer operations at the Francis Street/Riverway intersection. Under the current road pattern all drivers would be diverted to Deaconess Road to travel on Brookline Avenue to reach their ultimate destinations.

Conclusion

Based on the results of this study, several conclusions can be drawn:

- Pilgrim Road currently carries a relatively low volume of traffic, most of which is primarily affiliated with NEDH.
- Peak hour volumes on the section of Pilgrim Road proposed to be closed range from 120 vehicles per hour (vph) during the AM peak hour to 197 vph during the PM peak.
- On a daily basis, an estimated 2,100 vehicles per day (vpd) would be affected by the proposed closing of Pilgrim Road.
- The bulk of Pilgrim Road traffic would divert to Deaconess Road and would then proceed either east or west on Brookline Avenue. It is not expected that these diversions will significantly increase the amount of traffic at any of the area's signalized intersections.
- One of the major generators of traffic on Pilgrim Road is the NEDH garage and only 25 - 50 vehicles during either peak period can be considered through vehicles.
- The proposed closure could improve operations at the unsignalized intersection of Joslin Place and Brookline Avenue since the number of turns, particularly left turns into Joslin Place would be reduced to only those drivers dropping off at the relocated Deaconess main entrance.
- Closing Pilgrim Road would reduce the amount of traffic that would exit from Francis Street onto the Riverway. This location is currently unsignalized and based on the Riverway volumes, exiting from this point is extremely difficult, particularly for vehicles turning left or traveling straight out of Francis Street.
- The closure would eliminate pedestrian/vehicle conflicts on Pilgrim Road itself.

Based on the preceding findings, it does not appear that the closing of Pilgrim Road proposed by Payette Associates for the New England Deaconess Hospital will significantly affect traffic flow in the immediate study area proximate to the site.

1518/586/trm

Date: May 16, 1986
Ref: 1518

This report has not evaluated the potential transportation impacts of the proposed building project itself, nor has it developed mitigation measures or an access plan for the project.

cc: Hugh Sycamore, NEDH
Larry Koff, BRA
Bob Kroin, BRA
Phil Caruso, BTD

1518/586/trm

APPENDIX
— Origin Destination Survey Results

NEW ENGLAND DEACONESS HOSPITAL
PILGRIM ROAD
ORIGIN/DESTINATION SUMMARY

Deaconess Garage	10	Deaconess Garage	6
Joslin Diabetes Center	3	Deaconess Hospital	10
Hyde Park	2	Dedham	3
Cambridge	1	Medway	1
Deaconess School of Nursing	1	Melrose	1
Rego Bros. Pharmacy	1	Brockton	1
West Roxbury	1	Longwood Pharmacy	1
Roxbury	1	Walpole	1
Windsor School	1	Wellesley	1
Waltham	1	West Roxbury	1
Children's Hospital	1	Marshfield	1
Deaconess Hospital	1	West Bridgewater	1
E. Greenwich, CN	1	Randolph	1
Salisbury	1	Framingham	1
Westwood	1	Canton	1
Brookline	1	Marshfield	1
Dedham	1	Longwood, Riverway	1
Natick	1	Newton	1
MDC Police Base	1	Roslindale	1
Jamaica Plain	1	Park Square	1
Somerville	1		
Cape Cod	1		
Brookline Avenue	1		
Roslindale	1		
Total Motorists Interviewed	36		36

Was the trip a part of visit to N.E. Deaconess?	Yes	No	Total
	31	5	36

Survey conducted May 6, 1986 between 4:00 - 5:00 PM on the one way westbound section of Pilgrim Road at a location just west of Deaconess Road.

APPENDIX B

APPENDIX B

TRANSPORTATION ACCESS PLAN

for Access Plan Agreement

New England Deaconess Hospital
New Clinical Facility

prepared for

The New England Deaconess Hospital
185 Pilgrim Road
Boston, Massachusetts 02215

prepared by

Abend Associates
304 Concord Road
Wayland, Massachusetts 01778

617-358-7095

November 6, 1987

TABLE OF CONTENTS

	Page
Introduction	1
Existing Conditions and Volumes	5
Trip Generation	9
Pilgrim Road Closure	12
Hospital Building Access and Loading	24
Fire Access	26
Construction Access	28
Mitigation and Improvement of Traffic Flow	30
Added Lane on Brookline Avenue	33
Traffic Management and Reduction Program	35

APPENDIX

CAPACITY CALCULATIONS

LIST OF EXHIBITS

No.		Page
1	Orientation Map	3
2	Schematic Site Plan	4
3	Existing AM Peak Period Volumes	6
4	Existing PM Peak Period Volumes	7
5	Daily Traffic Volume Summary	8
6	Projected Traffic Diversion - AM	14
7	Projected Traffic Diversion - PM	15
8	Pilgrim Road Traffic Composition	16
9	Traffic Pattern - To/From Deaconess Entrance	17
10	Traffic Pattern - Through Traffic	18
11	Traffic Pattern - To/From Pilgrim Road Garage - North	19
12	Traffic Pattern - To/From Pilgrim Road Garage - South	20
13	Traffic Pattern - To/From Francis Street - North	21
14	Traffic Pattern - To/From Francis Street - South	22
15	Effect at Intersections	23
16	Hospital Access Points	25
17	Local Circulation Network	27
18	Proposed Traffic Mitigation	32
19	Proposed Brookline Avenue Widening	34

Introduction

The New England Deaconess Hospital (NEDH) proposes to make major changes to its hospital facility located in the Longwood medical area of Boston. The primary function of the proposed construction is to respond to changing health care demands by the public and will involve primarily the redeployment of hospital facilities. The project does not involve a significant increase in the square footage of the hospital or in its employment level but, rather, involves a change in the focus and arrangement of existing hospital facilities.

Program Changes - Specifically, the project will provide the following programmatic changes:

1. Closure of the nursing school.
2. Expansion of ambulatory services.
3. Replacement of administrative office space.
4. Relocation of the hospital entrance and visitor facilities.
5. Relocation of existing beds.
6. Enlargement of inpatient facilities to relieve existing overcrowding.

Physical Changes - Specifically, the physical changes to the Deaconess campus currently proposed are as follows:

1. Modifications to the Kennedy Building to convert it from a School of Nursing to an outpatient and ambulatory care facility.
2. Demolition of the Harris Building which is entirely devoted to administrative offices and which is currently overcrowded.
3. Elimination of the doctors' parking lot.

4. Demolition of stores at the corner of Deaconess and Brookline.

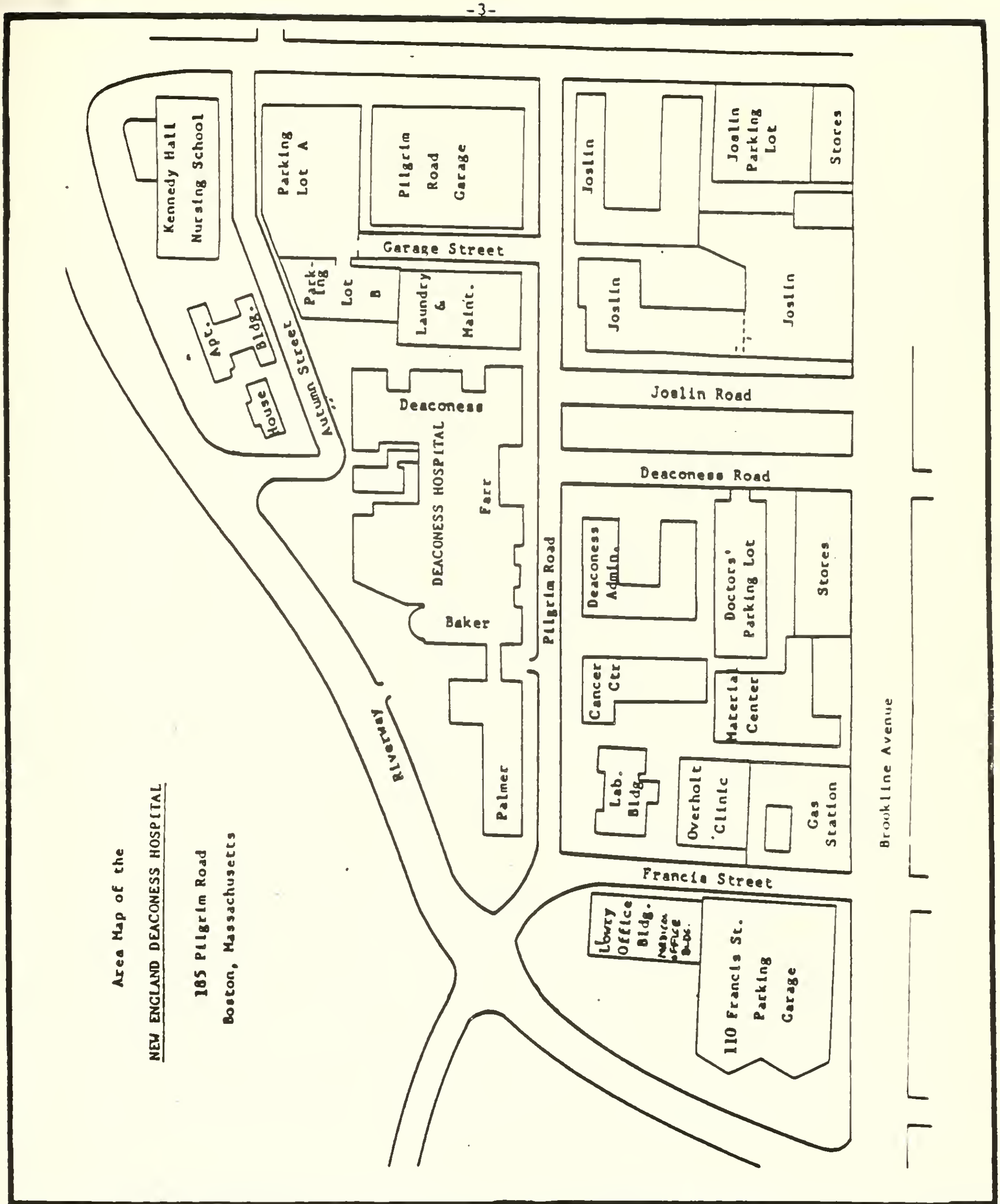
5. Closure of Pilgrim Road to through traffic from Deaconess Road to Francis Street.

The new building, which will be built on Deaconess and which is the only new construction involved in the renovations, will provide several functions, as follows:

USE	AREA
108 Patient Beds and 24 Acute Care Beds	100,000 square feet
Surgical Unit	50,000 square feet
Xray Unit	50,000 square feet
Lobby and Visitor Services and Facilities	25,000 square feet
Basement Area	25,000 square feet
TOTAL	250,000 square feet

The existing Kennedy Building which will be converted from a nursing school to an ambulatory care facility, contains 85,000 square feet which will remain unchanged following renovations and modifications.

Exhibit 1 is an orientation map showing the NEDH area, and Exhibit 2 is a Schematic Site Plan showing the proposed changes. The new building will eliminate the NEDH administration building, stores along Brookline Avenue, the doctors' parking lot, and a portion of the material center which will be relocated off campus to a suburban location. The impacts of this is addressed elsewhere.



Area Map of the

NEW ENGLAND DEACONESS HOSPITAL

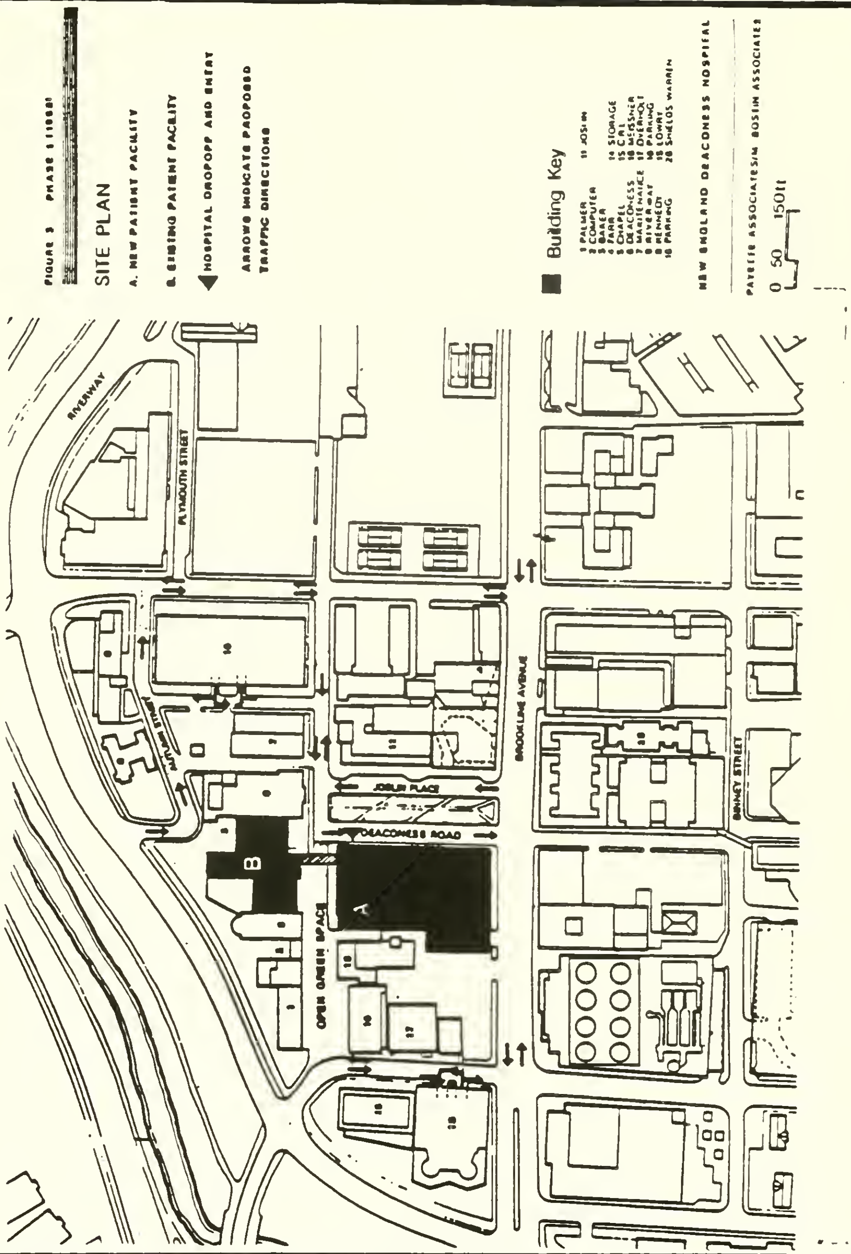
185 Pilgrim Road

Boston, Massachusetts

ORIENTATION MAP

ABEND ASSOCIATES

EXH. 1



SCHEMATIC SITE PLAN

FOR ORIENTATION PURPOSES ONLY

ABEND ASSOCIATES

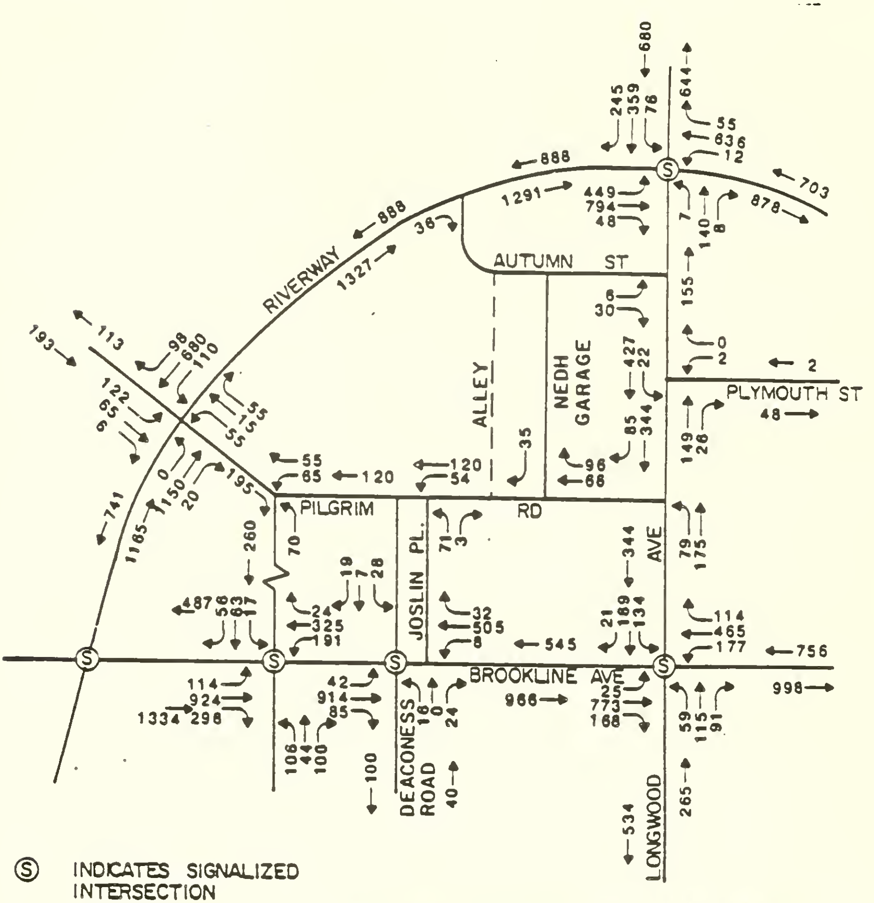
EXH. 2

Existing Conditions and Volumes

The NEDH complex occupies a large triangular area bounded by Brookline Avenue, Longwood Avenue and the Riverway. The orientation map exhibit shows that most of the buildings within that complex are part of the NEDH/Joslin Clinic/110 Francis Street Medical Office Building grouping. Because of this relationship to existing major streets, NEDH appears to have a somewhat better access and circulation system than other parts of the MASCO area.

As a result of the limited size of the campus and its location within major streets, the primary function of the internal street system within the NEDH area is to serve the hospital. The closure of Pilgrim Road between Brookline Avenue and Longwood Avenue several years ago further enhanced the position of internal streets serving local development by eliminating a fairly heavy short-cut movement that traversed the entire length of Pilgrim Road.

Exhibits 3 and 4 show existing morning and evening peak hour volumes on the road system in the NEDH area. These are excerpted from a traffic study done by Vanasse/Hangen Associates in 1986. Exhibit 5 taken from that same report shows the estimated Average Daily Traffic (ADT) for a number of road segments in the NEDH area. These volumes provide a basis for evaluating the impact of the project, in terms of traffic volumes and, especially, in relation to the proposed discontinuance of Pilgrim Road between Deaconess Road and Francis Street.



Ⓢ INDICATES SIGNALIZED INTERSECTION

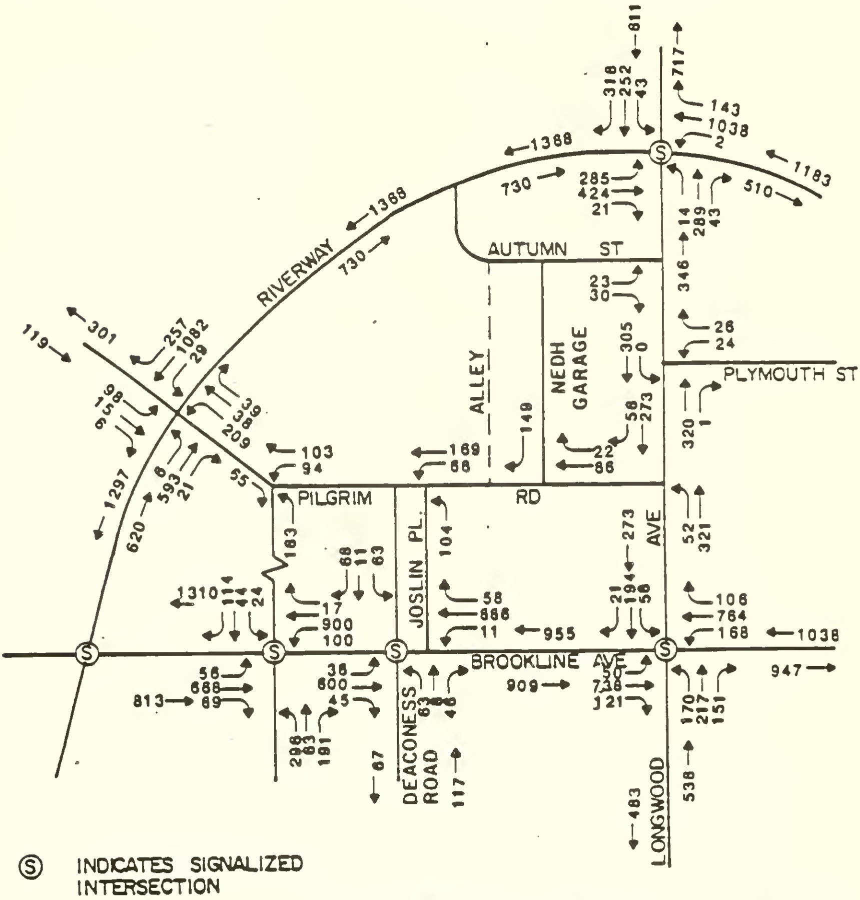
NOTE: Based primarily on volumes measured 4/85 and 5/86

Existing A.M. Peak Period Volumes

Vanasse/Hangen
Consulting Engineers & Planners

Not to Scale

EXHIBIT 3



NOTE: Based primarily on volumes measured 4/85 and 5/88

Vanasse/Hangen
Consulting Engineers & Planners

Existing P.M. Peak Period Volumes

Not to Scale

EXHIBIT 4

Memorandum page 4 of 8

Date: May 16, 1986
Ref: 1518

Table 2
Daily Traffic Volume summary

Location	ESTIMATED ADT*	AM Peak Hour** Volume	PM Peak Hour** Volume
Pilgrim Road just east of Joslin Place	2,700	177	235
Pilgrim Road east of Francis Street	2,100	120	197
Deaconess Road north of Brookline Avenue	1,300	54	142
Joslin Place north of Brookline Avenue	1,200	74	104
Francis Street between Pilgrim Rd & Riverway	3,700	320	351
Longwood Avenue between Binney & Blackfan Sts.	14,588***	999	1,025
Longwood Avenue between Pilgrim Rd & Brookline Ave.	9,000	598	646
Brookline Avenue north of Longwood Avenue	29,293***	1,754	1,985

* Average Daily Traffic - Estimate based on peak period turn volumes presented in Figures 1 and 2, except where *** indicates a different source.

** AM and PM Peak Volumes are reported from Figures 1 and 2. 7:30-8:30 AM and 4:00-5:00 PM represent the peak volume periods indicated in Figures 1 and 2.

*** September, 1983 data

EXHIBIT 5

Trip Generation

The proposed construction and renovation program will not result in the addition of new staff. As noted previously, the entire new building on Deaconess Road involves the relocation of existing overcrowded facilities and replacement of existing square footage on-site. Conversion of the Kennedy Building from a nursing school to an ambulatory care facility will modify its trip generation characteristics. Currently, the school operates on a predominantly 9:00 am to 5:00 pm basis with the bulk of arrivals during the morning peak hour and departures during the evening peak hour. The proposed ambulatory care facility will have slightly different characteristics.

The professional and technical staff of the nursing school will be replaced by a staff with different skills servicing the ambulatory care facility. There will obviously be the elimination of students, many of whom commute during the peak hours. Replacing peak hour traffic will be patient arrivals for outpatient care. The current projection for the Kennedy Building is for the treatment of 100 patients per day.

Experience at other ambulatory care facilities at NEDH shows that most of this activity occurs between 10:00 am and 3:00 pm, during which time background traffic volumes are lower. Assuming a uniform patient arrival/departure rate, particularly since most visits are scheduled, it is expected that on the average, there would be about 20 patients per hour. Based on previous studies of outpatients in the area, no reductions in trip generation have been made for walk-in, public transit, or "carpooling." These alternate modes are shown to constitute only about 15 percent of outpatient visits.

Thus, the hourly generation rates for the new generation will occur during the middle part of the day and this volume is expected to be 20 inbound and 20 outbound trips per hour between 10:00 am and 3:00 pm. The project is not expected to have any impact on peak hour trips.

In terms of peak hour traffic, the conversion of the Kennedy Building should result in a reduction in peak hour trips for the following reasons:

1. NEDH will set aside about 20 spaces in the Pilgrim Road garage for use by outpatients. This garage is ideally located directly across the street from the Kennedy Building. This garage is now used primarily by commuters and the set-aside of spaces for midday use will result in a slight reduction in peak hour volumes. As noted elsewhere, these commuter cars will be accommodated off-campus, either at off-site parking lots operated by NEDH or at other locations operated by MASCO. This assumes no change in commuting mode.

2. The trip generation associated with the new building on Deaconess Road is assumed to cause no reduction in trip generation even though a doctors' parking lot will be removed. As yet, the hospital is undecided as to whether these spaces will be replaced at a nearby location or whether they will be put into the garage. This would result in a further reduction in commuter spaces and another slight reduction in peak hour travel associated with NEDH.

A summary of the major components of the project and their effect on trip generation follows:

* 108 Project Beds (75,000 sq. ft.)	A one-for-one replacement of beds to relieve overcrowding in existing buildings - No change in trip generation.
* 24 Acute Care Beds (25,000 sq. ft.)	A one-for-one relocation of existing beds - No change in trip generation.
* Surgical Unit (50,000 sq. ft.)	Replacement and enlargement of existing facilities - No change in trip generation.
* Lobby and Visitor Facilities	Relocation and enlargement, but no change in number of hospital beds - No change in trip generation.
* Basement Area (25,000 sq. ft.)	Storage area - No trip generation.
* Reallocation of Doctors' Parking (50 spaces)	Displacement of commuter spaces by replacement of these spaces will result in a reduction of peak hour trips - Slight net reduction in peak hour trips.

* Removal of Harris Hall (52,000 sq. ft.)	Offices will be relocated elsewhere in hospital - No increase in employment - No change in trip generation.
* Nursing School Conversion	Use of building for outpatients will increase midday trips, but peak hour trips will stay constant since projected staffing of buildings is equal to existing staffing of nursing school - No change in peak hour trip generation.

In sum, the project is not expected to generate any additional traffic during peak hours. There will be a slight increase in off-peak trip generation which will be offset by reductions at other times of the day, especially during the commuter peaks.

Pilgrim Road Closure

The loss of Pilgrim Road between Deaconess Road and Francis Street would affect the travel pattern of about 100 vehicles during the morning peak hour and about 180 vehicles during the evening peak hour. The effect of the traffic pattern change is discussed below.

Exhibits 6 and 7 show the existing morning and evening peak hour volumes at the Pilgrim Road/Francis Street intersection and the likely diversion of this traffic. Exhibit 8 provides an estimated breakdown of traffic now using the street.

Deaconess Road will probably be most affected by the discontinuance. Most vehicles now using Pilgrim Road to reach Francis Street eastbound would be diverted to Deaconess Road. However, the street can easily accommodate the added traffic of about 60 cars in the morning and about 90 cars in the evening. This might benefit Francis Street operations which include the front door activities at 110 Francis Street Medical Building and garage.

Diversions are also expected onto Autumn Street. Some Pilgrim Road garage trips that now use Pilgrim Road to reach the Riverway will opt for a routing via Autumn and Longwood. A routing along Garage Road and Autumn Street provides a comparable routing from the garage to the Riverway southbound. (Although Autumn Street is signed as a one-way at Longwood, the left turn from Garage Road to Autumn Street is not prohibited by signing.)

The before and after diagrams shown in Exhibits 9, 10, 11, 12, 13, and 14 indicate how movements now using Pilgrim Road will be changed. Also shown in the diagrams are the estimated morning and evening volumes associated with each identified movement.

As the diagrams show, the change in traffic pattern does not result in any large increases in volumes at the three major intersections defining

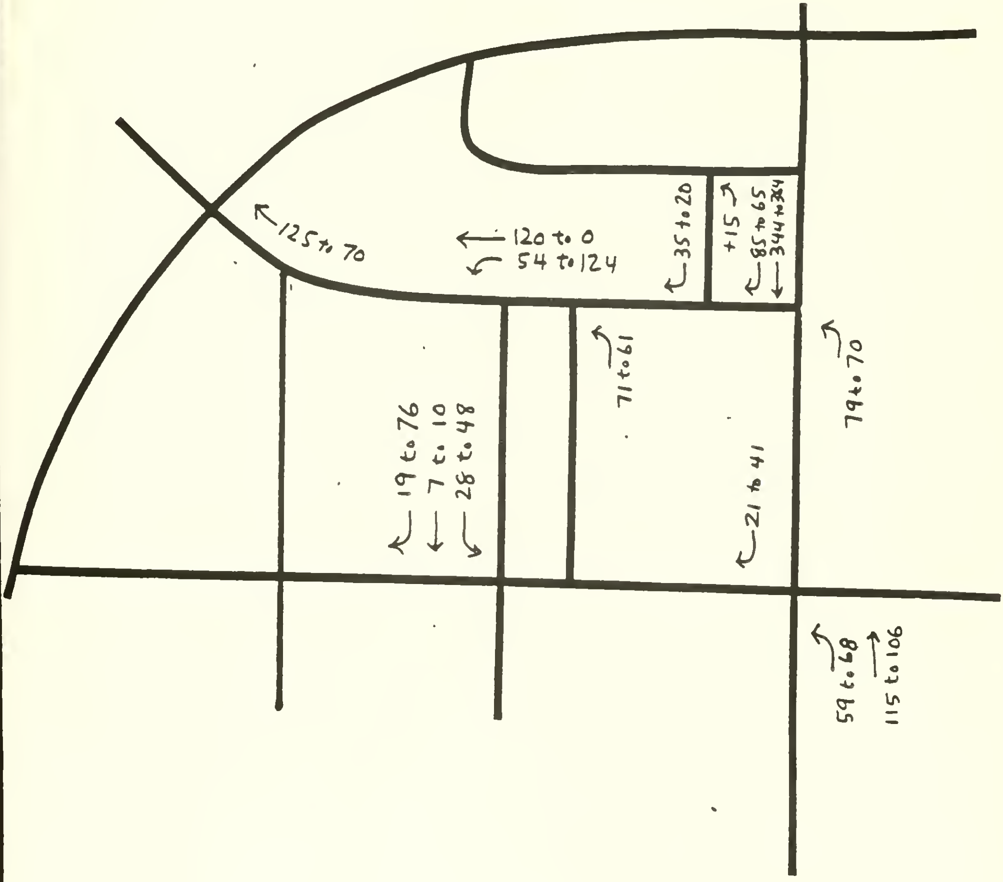
the corners of the NEDH "triangle." In many instances, traffic on Pilgrim Road already goes through one of the key intersections. Thus, the reduction in volume on the proposed discontinued section of Pilgrim Road will not necessarily result in an equivalent volume of traffic added to Brookline Avenue or the Riverway, the two parallel roads to Pilgrim Road.

It is important to note that regardless of which route is chosen, traffic entering and/or leaving the NEDH triangle must travel through one of the corner intersections. The closure of Pilgrim Road will not change this.

Given the opportunities that exist for alternate routings, the relatively small number of trips involved, and the traffic pattern in the area, the loss of circulation on Pilgrim Road as proposed should not result in any major change in overall circulation or in the traffic operations of any existing intersection.

The diversion of this traffic will not have the effect of overloading existing intersections. The large local orientation of Pilgrim Road traffic and the alternate route options will result in adjustments in volume that are small overall and even smaller at any single location.

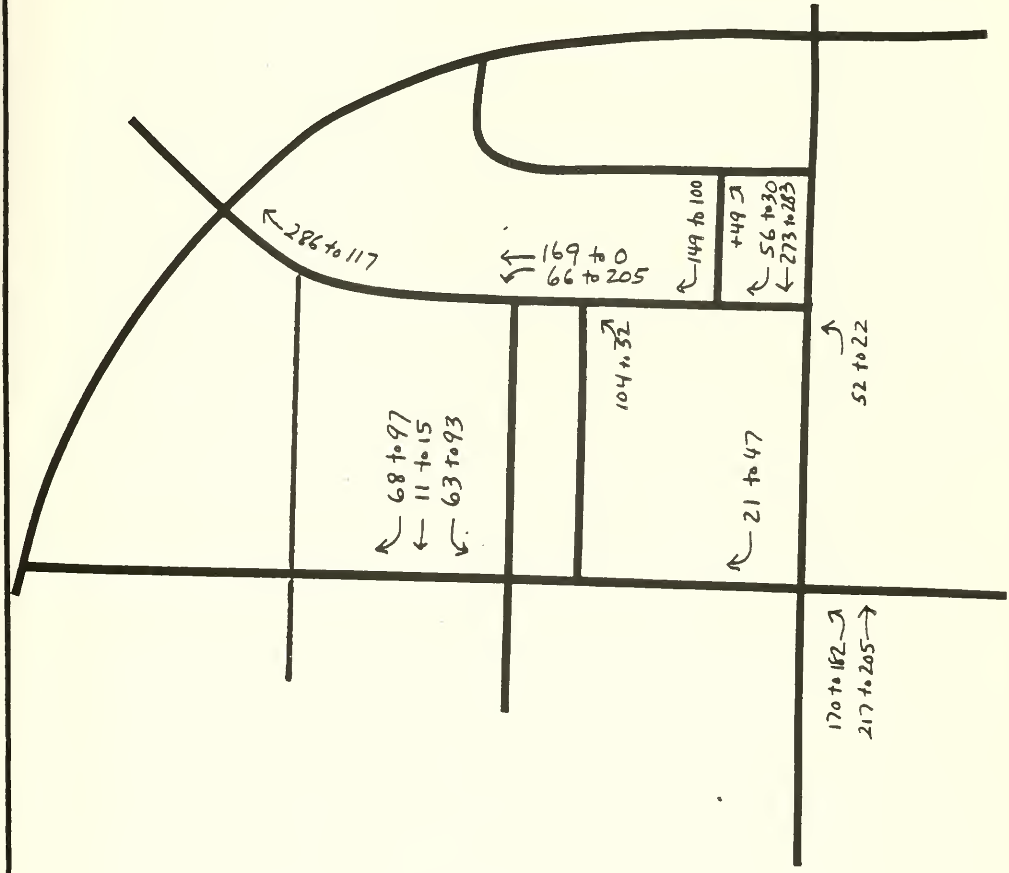
The table shown in Exhibit 15 provides a summary of Delay and Level of Service for the intersections most affected by the closure of Pilgrim Road. The delay and capacity calculations are shown in the appendix. The change in volumes is based on the traffic pattern/volume analysis described above. The table shows that the projected effect of the closure is very small, and that there are both increases and decreases in delay, depending on the location and time of day. In no case does the Level of Service change as the result of the Pilgrim Road closure. The calculations are shown in the appendix.



PROJECTED TRAFFIC DIVERSION-AM

ABEND ASSOCIATES

EXH 6



PROJECTED TRAFFIC DIVERSION–PM

ABEND
ASSOCIATES

EXH
7

ESTIMATED BREAKDOWN OF PILGRIM ROAD TRAFFIC
on Proposed Discontinued Portion of Street

Movement	AM		PM	
	Percent	Number	Percent	Number
To Deaconess Entrance	50	60	20	40
To 110 Francis Street	30	36	15	30
From Pilgrim Road Garage	10	12	45	88
Other and Through Traffic	10	12	20	40

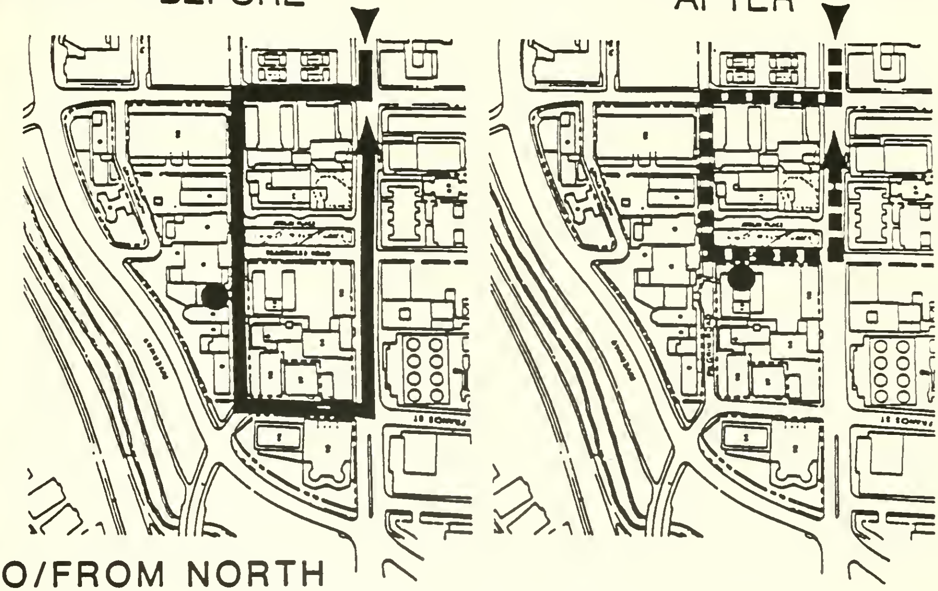
PILGRIM RD. TRAFFIC COMPOSITION

ABEND
ASSOCIATES

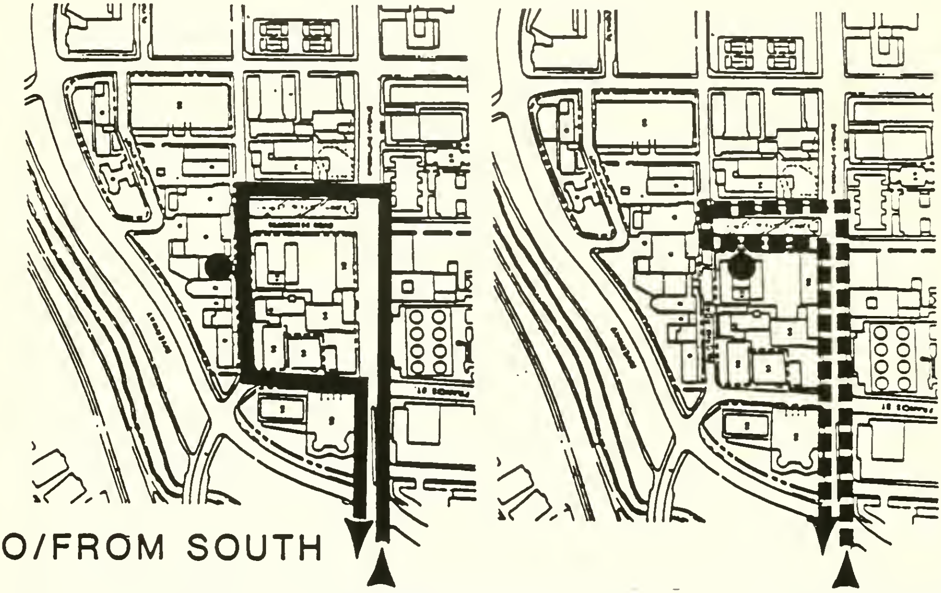
EXH.
8

am-60 pm-40

BEFORE AFTER



TO/FROM NORTH



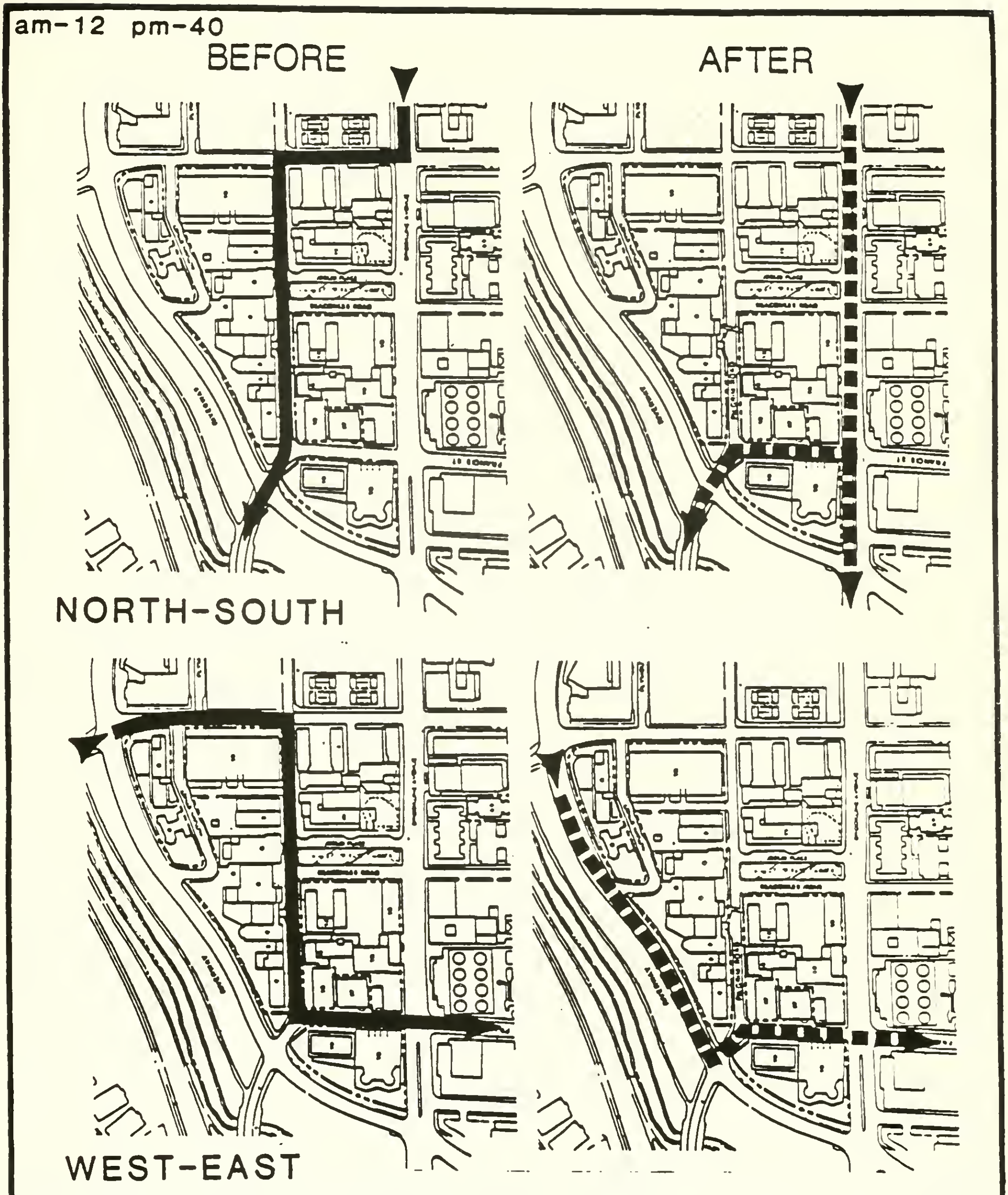
TO/FROM SOUTH

TRAFFIC PATTERN

TO/FROM DEACONESS ENTRANCE

ABEND ASSOCIATES

EXH. 9



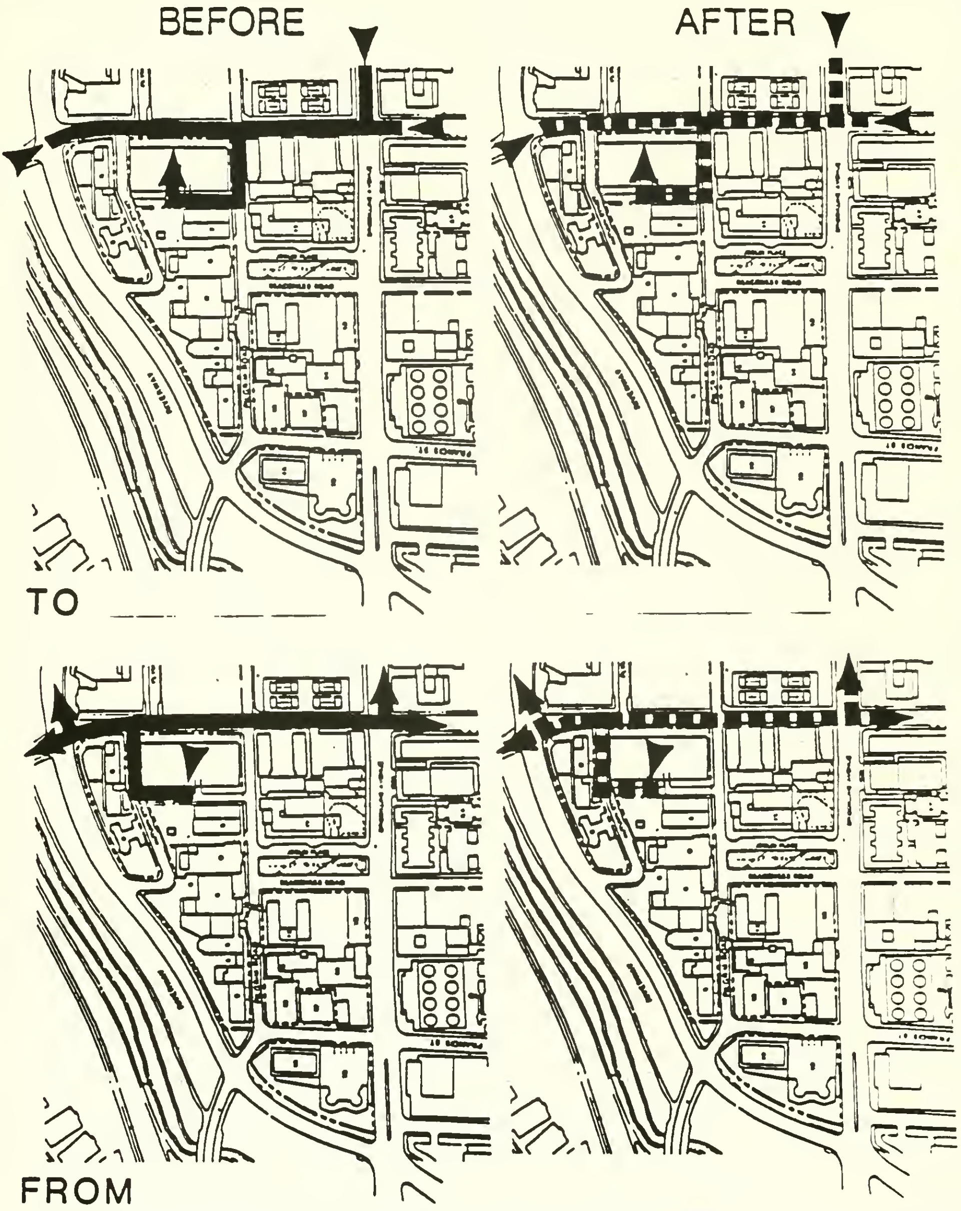
TRAFFIC PATTERN

THROUGH TRAFFIC

ABEND ASSOCIATES

EXH. 10

am-50 pm-88

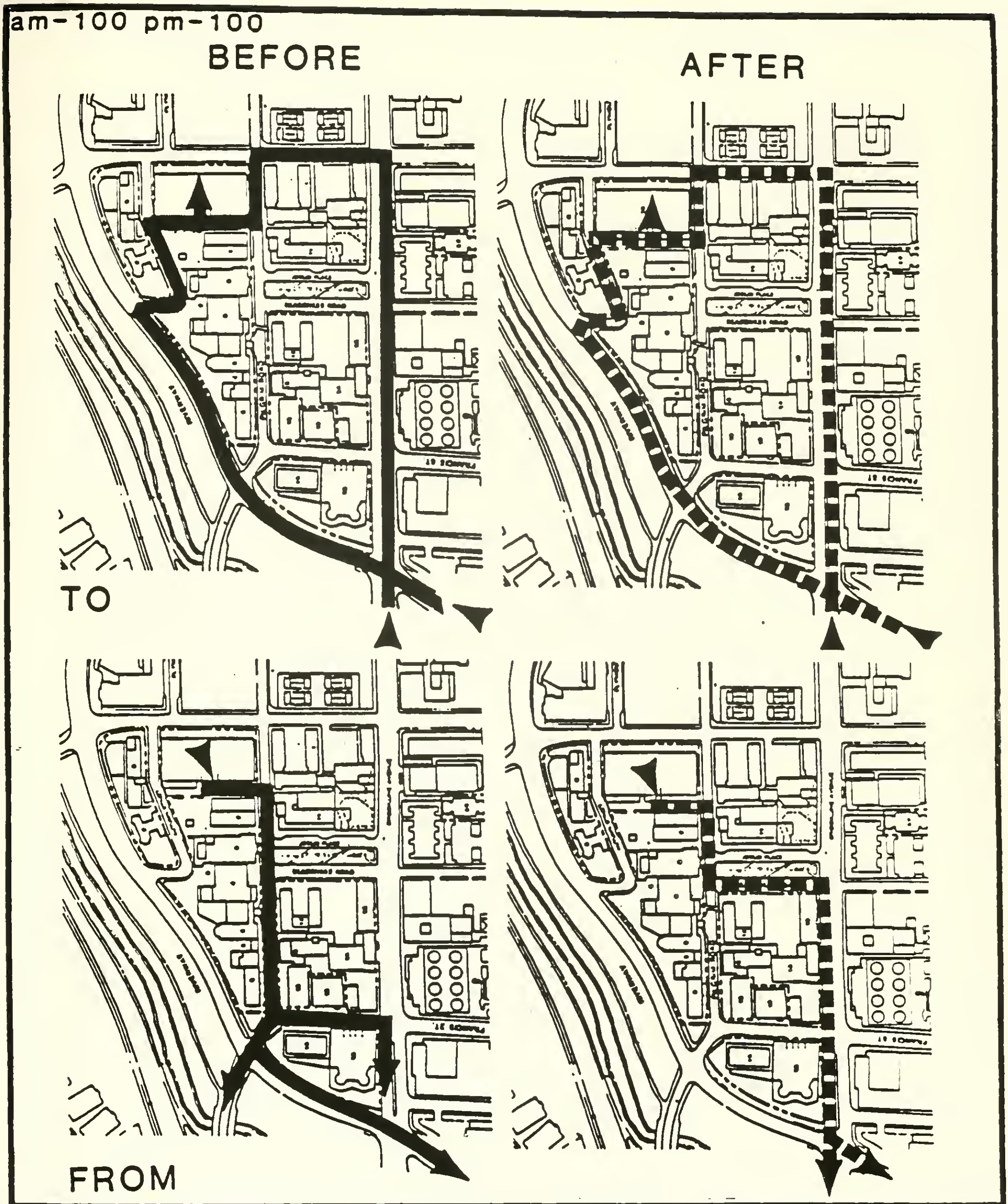


TRAFFIC PATTERN

TO/FROM PILGRIM RD. GARAGE-NORTH

ABEND ASSOCIATES

EXH. 11



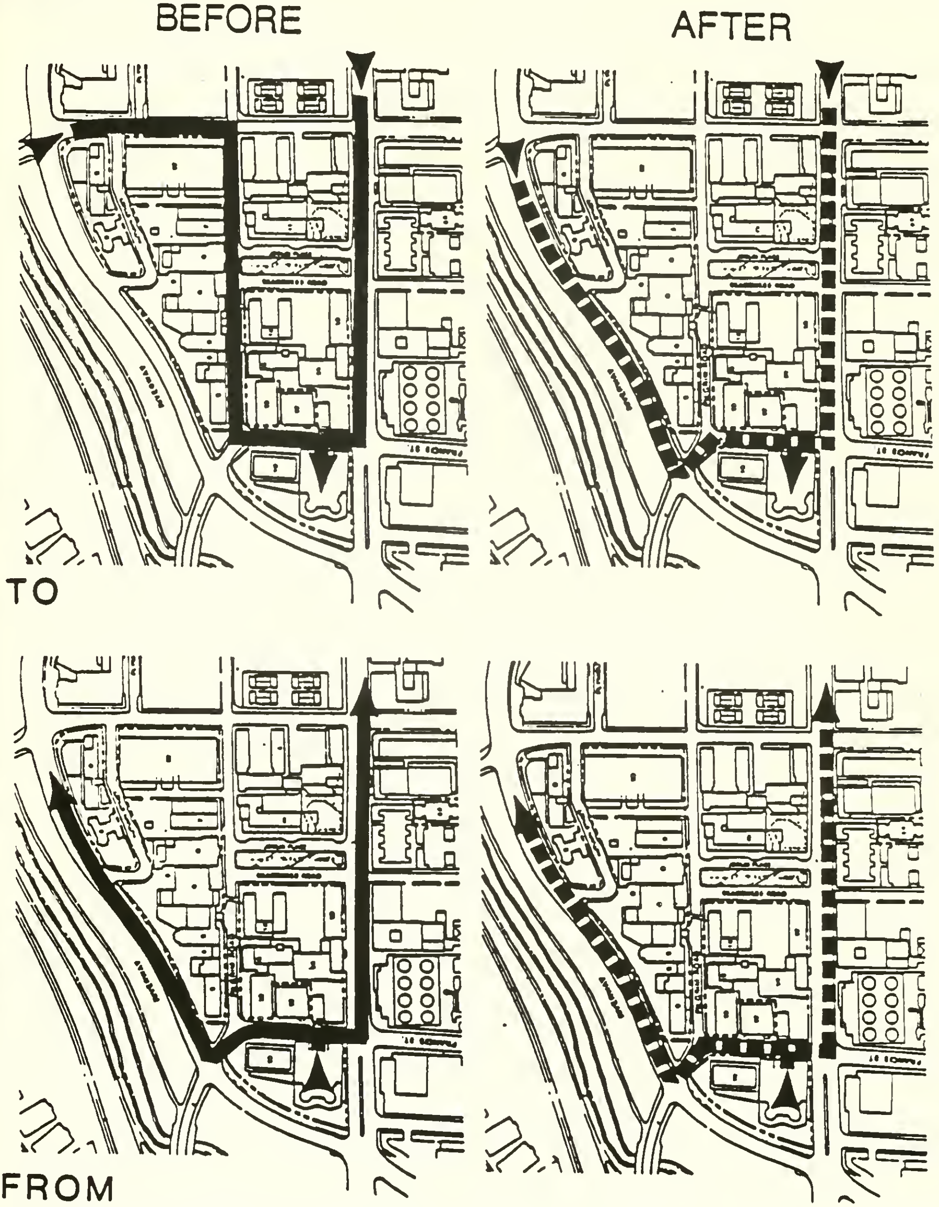
TRAFFIC PATTERN

TO/FROM PILGRIM RD. GARAGE-SOUTH

ABEND ASSOCIATES

EXH. 12

am-36 pm-30



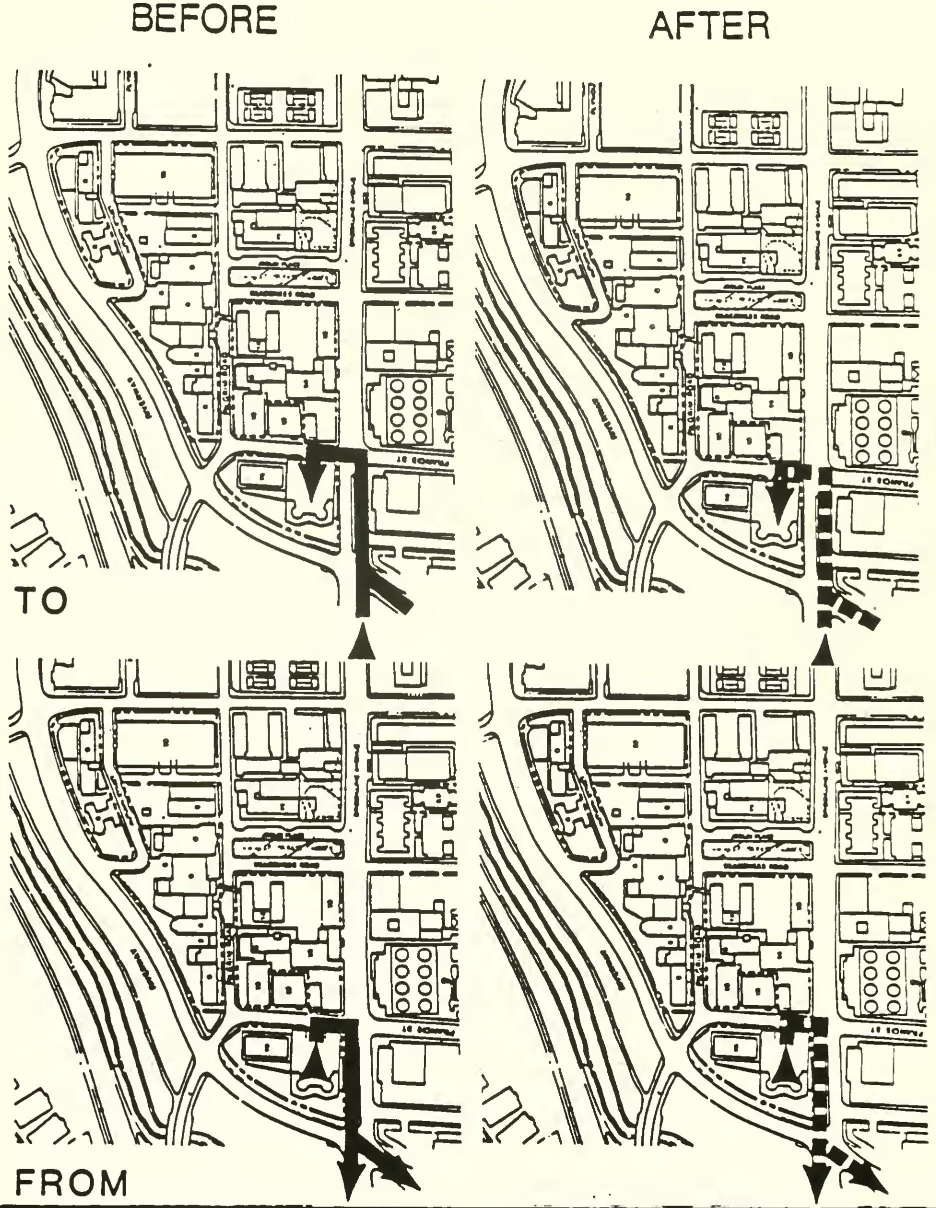
TRAFFIC PATTERN

TO/FROM 110 FRANCIS ST. - NORTH

ABEND
ASSOCIATES

EXH.
13

am-36 pm-30



TRAFFIC PATTERN

TO/FROM 110 FRANCIS ST. - SOUTH

ABEND ASSOCIATES

EXH.
14

DELAY AND LOS SUMMARY

Intersection	AM Peak Hour		PM Peak Hour	
	Existing	w/Pilgrim Rd. Closed	Existing	w/Pilgrim Rd. Closed
Brookline/Francis	24.67/C	21.74/C	80.04/F	82.82/F
Brookline/Deaconess	1.88/A	2.15/A	4.03/A	4.82/A
Brookline/Longwood	5.28/B	5.15/B	18.20/C	18.04/C

EFFECT AT INTERSECTIONS

ABEND
ASSOCIATES

EXH.
15

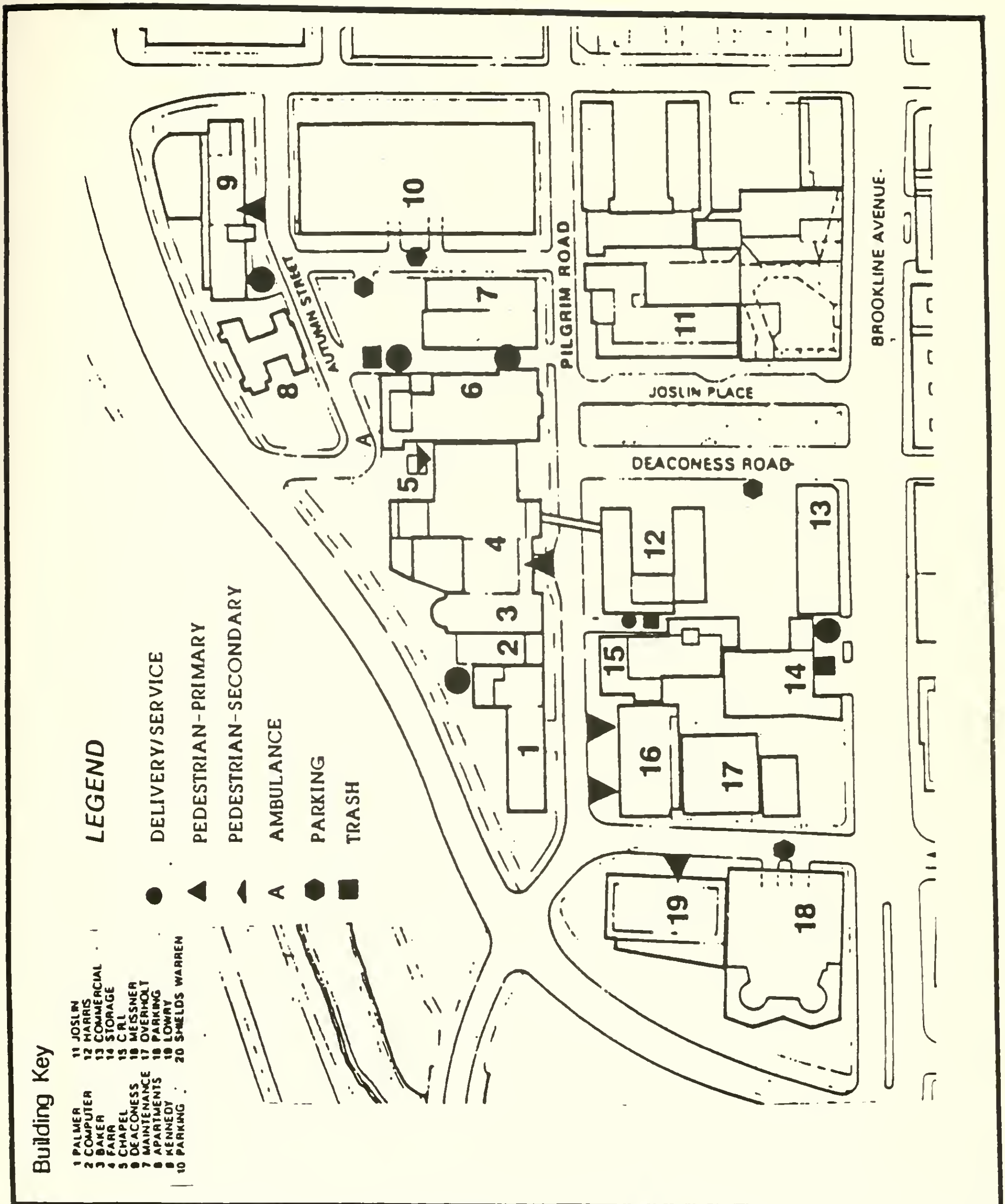
Hospital Building Access and Loading

Exhibit 16 shows a plan of the campus showing the access points to all buildings. The access points are broken up into five categories, as follows:

1. Primary Pedestrian Access
2. Material Delivery
3. Parking Access
4. Ambulance Access
5. Rubbish Pick-Up

It is noteworthy that the primary access on Pilgrim Road between Longwood Avenue and the Riverway is the main pedestrian access on Pilgrim Road which will be relocated to Deaconess Road as part of the proposed new construction. Relocation of the main entrance is part of the overall master plan for the hospital and is consistent with the projected circulation in the area.

The proposed closure of Pilgrim Road between Deaconess Road and Francis Street will not affect the existing or future operations of the hospital. The new building will be served by a loading dock at the former Material Center off of Brookline Avenue and the receiving area at the Laundry Building and will not add to the number of truck docks on the NEDH campus. The Material Center will be relocated off-campus as part of the project. No access points of any other property owner will be affected by the closure of Pilgrim Road. The closure is not expected to have any effect on any routes of approach or departure although there may be some slight dislocation regarding access to the Cancer Research Center.



HOSPITAL ACCESS POINTS

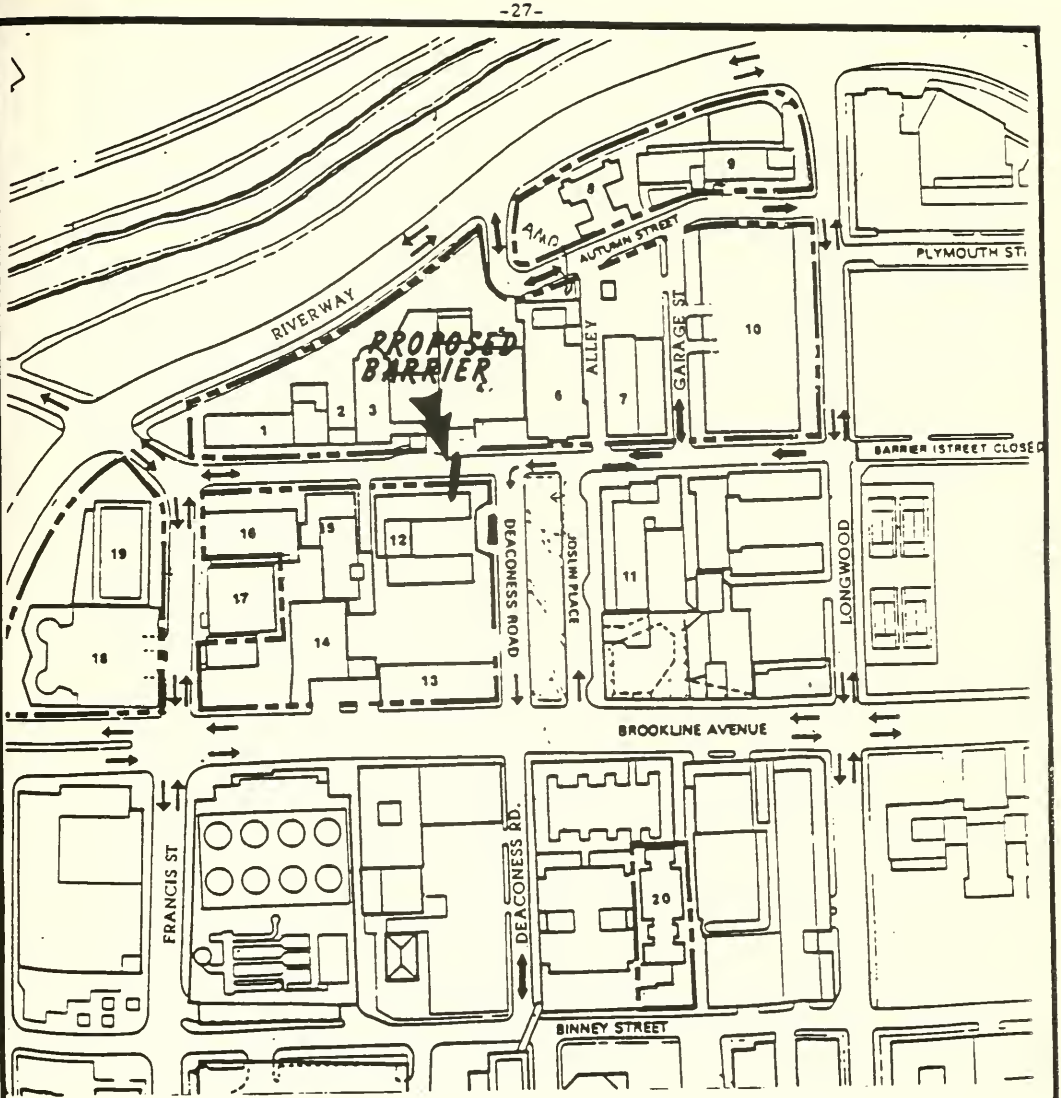
ABEND
ASSOCIATES

EXH
16

Fire Access

Exhibit 17 shows a diagrammatic representation of the streets that would be available for circulation in the area after the discontinuance of the short section of Pilgrim Road. The area is laced with both major and minor streets and privately owned driveways providing good public safety access. The NEDH campus is surrounded by three major streets and is broken into small areas by several smaller streets which serve the hospital and cut through the campus. Except for the portion occupied by the bridge link, Pilgrim Road will still be available for emergency vehicle access.

NEDH will make provisions in their connection structure across Pilgrim Road to permit emergency access through the structure so that fire-fighting personnel and hoses can move freely from one side to the other. The connections would have doors that would normally be closed but could be opened for emergencies. The discontinued portion of Pilgrim Road would be designed so that emergency vehicles would continue to have direct access to all buildings.



LOCAL CIRCULATION NETWORK

ABEND
ASSOCIATES

EXH
17

Construction Access

In coordination with its construction management team, the Hospital will provide the City with an appropriate construction management plan when the details of construction have been completed. Because most of the construction involves frontage along interior streets, namely Deaconess Road and Pilgrim Road, construction phase impacts on Brookline Avenue are expected to be small.

If the closure of Pilgrim Road is made prior to construction, it is expected that the discontinued portion of Pilgrim Road will serve as an important staging area for construction, particularly since the focus of construction is at that location.

On Deaconess Road, the current cross-section provides for parallel parking on both sides of the street and one wide lane for through traffic. It appears at this point that the removal of parking along the curb where construction will occur will be necessary. However, the travel lane and the parallel parking along Joslin Park will be unaffected by construction activities and could remain.

On Brookline Avenue, the current construction plan does not require the displacement of parking or any travel lanes. Since the project calls for the widening of Brookline Avenue by one lane between Deaconess Road and Francis Street, this widening should take place during the early phases of construction and then used for construction staging. Theoretically, this would allow the existing curb parking to remain. Practically, however, it is likely that the curb parking along the Brookline Avenue block face between Deaconess Road and Francis Street would probably be discontinued for parts of the construction project. These details will be refined in the Construction Access Plan.

In sum, based on the current plans, the construction process will not result in any reduction in travel lanes on any streets. It will probably result in the removal of curb parking on one side of Deaconess Road and, possibly, on one block face of Brookline Avenue. A total of about 15 spaces

are involved. Construction truck access will be along major arterial streets already used for construction access to other developments in the medical area. The Riverway is not accessible to trucks and will not be used for access. Any local streets used for construction access are those within the NEDH area and will not affect abutters. Joslin Park will be unaffected by construction and will continue to function, as will the remaining open portion of Pilgrim Road and all other streets in the NEDH campus. These matters will be resolved in the construction management plan at which point the contractor will be involved.

Mitigation and Improvement of Traffic Flow

NEDH has considered and proposes several modifications which would mitigate any adverse effect resulting from the closing of Pilgrim Road to through traffic and would substantially improve local traffic conditions on Brookline Avenue:

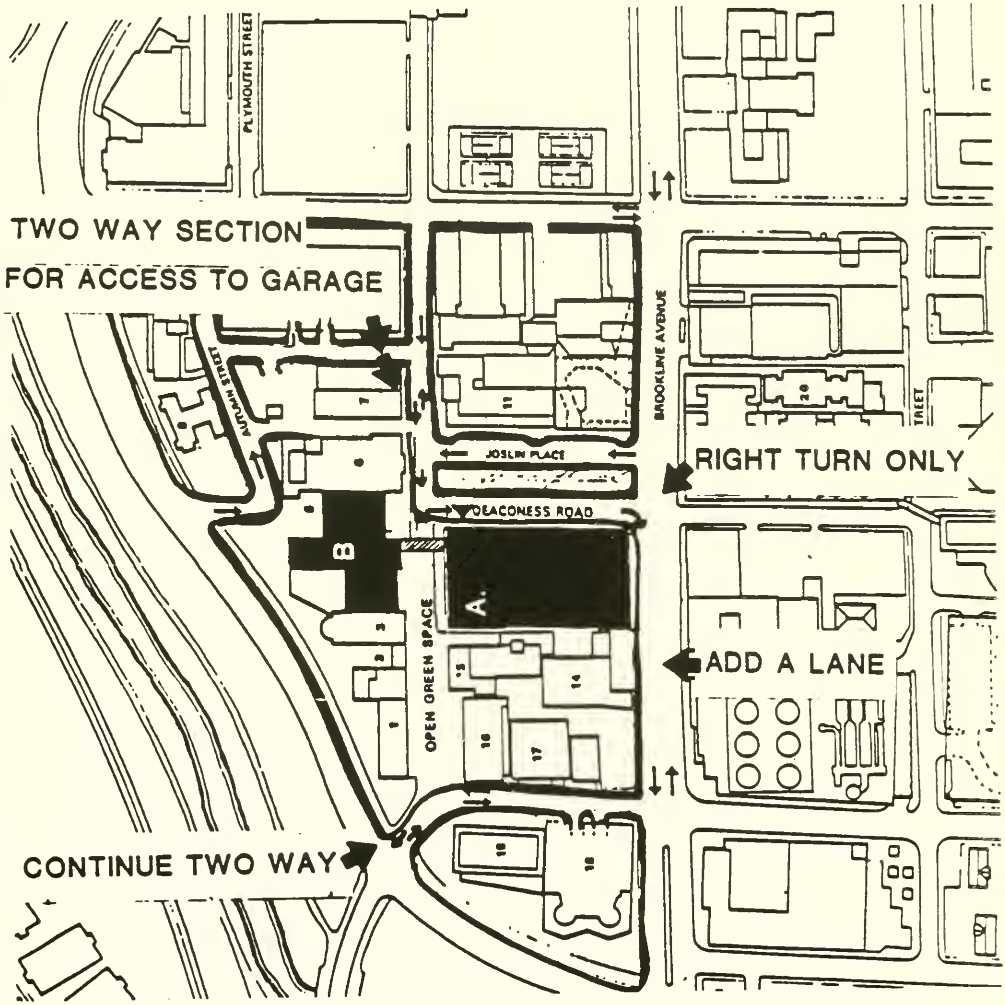
1. Provide the City of Boston with a widening of Brookline Avenue between Deaconess Road and Francis Street to accommodate a third lane in the southbound direction.
2. Prohibit left-turns onto Brookline Avenue from Deaconess Road. This would force cars leaving the NEDH campus to proceed south to the Riverway or to alternate routes, decreasing northerly traffic on Brookline Avenue and relieving the congestion caused by left-turns onto Brookline Avenue.
3. Make Pilgrim Road two-way from Joslin Place to the garage access road. This will permit south-oriented traffic to enter the garage without going through the Brookline/Longwood intersection.
4. Relocate NEDH's main supply center on Brookline Avenue between Deaconess Road and Francis Street to an off-site location. Only full consolidated loads would be transferred to the hospital during off-peak periods.

NEDH does not plan on any additional parking on its campus. The proposed construction will result in a net reduction in employee commuter spaces which will result in a decrease in peak hour volumes. The proposed changes are as follows:

1. Eliminate approximately 20 employee parking spaces in the Pilgrim Road garage and use these spaces for patient parking for the ambulatory care unit. This will reduce peak hour volumes since patient visits are scheduled during the middle part of the day.
2. A doctors' parking lot of about 50 spaces will be eliminated by the construction of the new building. These spaces will be replaced either

ing existing employee commuter spaces or by partial replacement at other locations. This will result in some reduction in peak hour trips.

Exhibit 11 shows the location of the proposed traffic mitigation. The net result of these actions is expected to result in a reduction in peak hour trips generated by the hospital. The increase in roadway capacity by the added southbound lane on Brookline Avenue should have a noticeable effect on local traffic conditions. The prohibition of left-turns from Deaconess onto Brookline should enhance the overall upgrading.



PROPOSED TRAFFIC MITIGATION

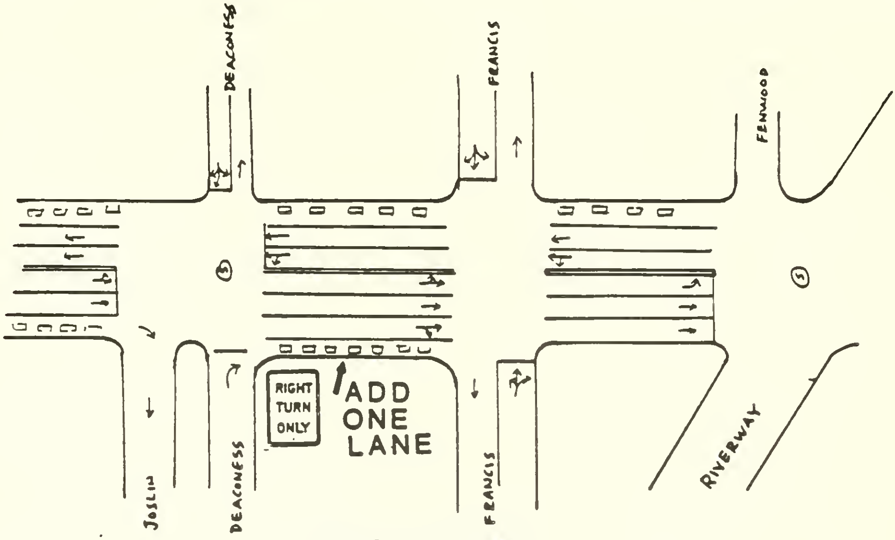
ABEND ASSOCIATES

EXH. 18

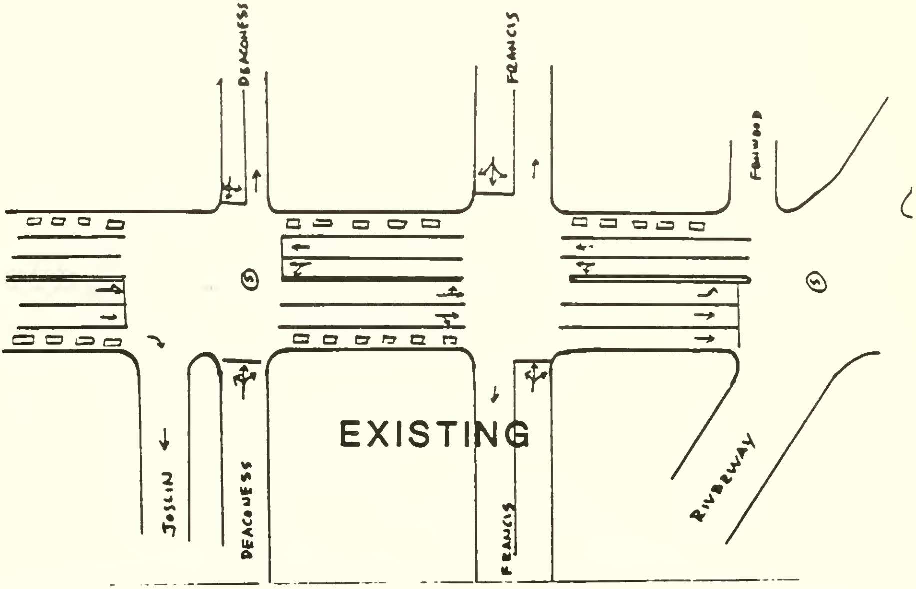
Added Lane on Brookline Avenue

To mitigate the impacts of the project, and to improve the overall traffic congestion in the Longwood Medical Area, NEDH has proposed the widening of Brookline Avenue to add an extra lane southbound between Deaconess Road and Francis Street. This will tie in with the three lane southbound cross-section south of Francis Street as shown in Exhibit 19.

This will provide extra storage for the signal at Brookline/Riverway as well as an extra lane through the Brookline/Francis intersection. This will improve the situation here by allowing storage for the left-turn into Francis Street. Regardless of how the extra lane is used, it is an improvement that has definite and substantial value. It is a direct replacement for the loss of the one southbound lane on Pilgrim Road and will compensate for the proposed closing of Pilgrim Road.



PROPOSED



EXISTING

PROPOSED BROOKLINE
AVE. WIDENING

ABEND
ASSOCIATES

EXH.
19

Traffic Management and Reduction Program

A number of actions have been taken by NEDH to enhance the use of public transportation and carpools, and to reduce the total volume of automobiles approaching the hospital.

It is particularly noteworthy that the current hospital expansion will result in a reduction in parking spaces used by commuting employees which the hospital does not intend to substitute for elsewhere in the immediate area.

Among the traffic management and reduction measures that the hospital engages in are the following:

1. The establishment of two off-site parking lots that are served by a MASCO or an NEDH shuttle bus. These lots are in locations that are specifically intended to prevent additional vehicles from approaching the MASCO area.
2. The hospital provides a convenient on-site location for purchasing MBTA passes, and actively encourages their use by in-house mailings and correspondence.
3. The hospital subsidizes MBTA passes for its employees.
4. The hospital operates a self-park valet system at the 110 Francis Street garage to provide peak period parking, generally between the hours of 11:00 am to 2:30 pm. This is the time when parking demand is greatest for patients. This type of parking is specifically for patients and does not adversely affect the commuter peak hours. It is noteworthy that a growing proportion of the hospital's parking supply is being devoted to patient parking. Although the hospital's parking supply has remained constant, the employee parking supply has been reduced.

NEDH is an active MASCO participant and supports all MASCO programs aimed at reducing local traffic. In addition, the hospital has its own program for off-site parking and is investigating additional off-site parking

locations. The hospital has no plans for expanding on-site parking and has gradually reduced the number of commuter spaces by allocating spaces for midday non-commuter purposes.

APPENDIX

VH
[illegible]
[illegible]
[illegible]
[illegible]

[illegible]
[illegible]

May 16, 1986

Ref: 1518

Mr. Robert Kroin
Boston Redevelopment Authority
One City Hall Square
Boston, MA 02201

Re: New England Deaconess Hospital

In advance of our meeting on Wednesday, May 21, 1986 at 9:30 AM to discuss the New England Deaconess Hospital's patient care facility, I am pleased to transmit a copy of a memorandum prepared by Vanasse/Hangen on traffic issues.

We look forward to the opportunity to review this project with you.

Very truly yours,

VANASSE/HANGEN

David A. Bo

David A. Bohn, P.E.
Associate

DAB/mef
Enclosure

cc: Larry Koff, BRA
Phil Caruso, BTD
Gary Lahey, Payette Assoc.
Hugh Sycamore, NEDH

1518/586/trl

VH

Memorandum

To: Mr. Gary Lahey, Principal
Payette Associates
40 Isabella Street
Boston, MA

Date: May 16, 1986

Ref: 1518

From: Vanasse/Hangen
60 Birmingham Parkway
Boston, MA 02135

Re: New England Deaconess Hospital - Proposed Patient Care Facility Replacement

---

Introduction

The New England Deaconess Hospital (NEDH) has proposed the construction of a new building which would be located adjacent to existing hospital facilities and require the closure of a portion of Pilgrim Road. NEDH is located in Boston's Longwood Medical Area (LMA) in a triangular area bounded by Riverway, Longwood Avenue and Brookline Avenue. Pilgrim Road functions as a relatively minor local street in the network and it primarily serves to provide direct access to NEDH and its main patient entrance which is located just west of Deaconess Road. In order to quantify the impacts of the proposed closure, a series of detailed traffic observations were conducted including mechanical recorder counts, manual turning movement counts and a brief origin - destination survey. The following sections of this report describe the technical approach and detail the findings of the analysis.

Study Area

The boundaries defined for this study of the proposed closure of Pilgrim Road are Riverway on the north and west, Brookline Avenue on the south and Longwood Avenue on the east. Within this study area are several additional roadways including:

Pilgrim Road
Deaconess Road
Joslin Place
Autumn Street
Francis Street
NEDH Garage Access Road
Alley between Deaconess and Maintenance Buildings

Brookline Avenue, Riverway and Longwood Avenue all function as major arterial roadways carrying daily volumes in excess of 9,000 vehicles per day (vpd).

1518/586/tm

Date: May 16, 1986
Ref: 1518

The other roadways in the study area all function as collector roadways by providing local access to adjacent land uses and to a lesser degree, they carry only a limited amount of regional and through traffic.

Several of the smaller roadways in the study area are posted as one way streets. These roadway segments are:

Deaconess Road - one way eastbound between Pilgrim Road and Brookline Ave.
Joslin Place - one way westbound
Autumn Street - one way northbound
Pilgrim Road - one way westbound (between Longwood Avenue and Francis Street only)

Pilgrim Road itself is approximately 25 feet wide on the one one way westbound section near Deaconess Road. Drivers arriving at the existing main entrance in the Fair Building use a small drop off loop which has been constructed on the north side of Pilgrim Road, just west of Deaconess Road.

Two major NEDH parking facilities are located in the study area: (1) the 10 Francis Garage - 310 spaces, and (2) the NEDH garage adjacent to Longwood Avenue and Pilgrim Road - 751 spaces. Several other small parking lots are also located in the study area, in addition a limited amount of on-street parking on Brookline Avenue, Deaconess Road, Joslin Place, Autumn Street and Pilgrim Road near the NEDH garage.

On going Development in the LMA

There are several on-going building projects currently under construction in the LMA including the following:

- Brigham & Womens ASB II Building & 240 space garage - Francis Street
- Dana-Farber addition - Brookline Avenue
- Children's Hospital, Blackfan Project - Bed replacement, Longwood Avenue
- Harvard University Teaching Facility - Longwood Avenue
- Galleria expansion at Longwood/Brookline Avenues

In addition to these projects, MASCO has initiated discussions for a development on the site of the Temple Israel parking lot. At this point however, the project is only in its conceptual planning stages.

1518/586/trm

Data Collection

A detailed traffic counting program was conducted in the section of the LMA adjacent to the Deaconess Hospital. Included were both manual peak period turning movement observations conducted by NEDH Staff as well as mechanical recorder counts. Additionally, a one hour origin-destination survey was conducted to aid in the identification of Pilgrim Road travel patterns. The purpose of this effort was to identify the major travel patterns in the study area and to quantify the usage level of Pilgrim Road.

Because there is a considerable amount of traffic volume data available from previous Vanasse/Hangen studies, the new data collection effort focused on roadways which have not been recently counted. Counts were taken by NEDH Staff and adjusted manually by Vanasse/Hangen Staff. The following table summarizes the locations which were counted manually as part of this study:

Table 1
Traffic Data Collection Program

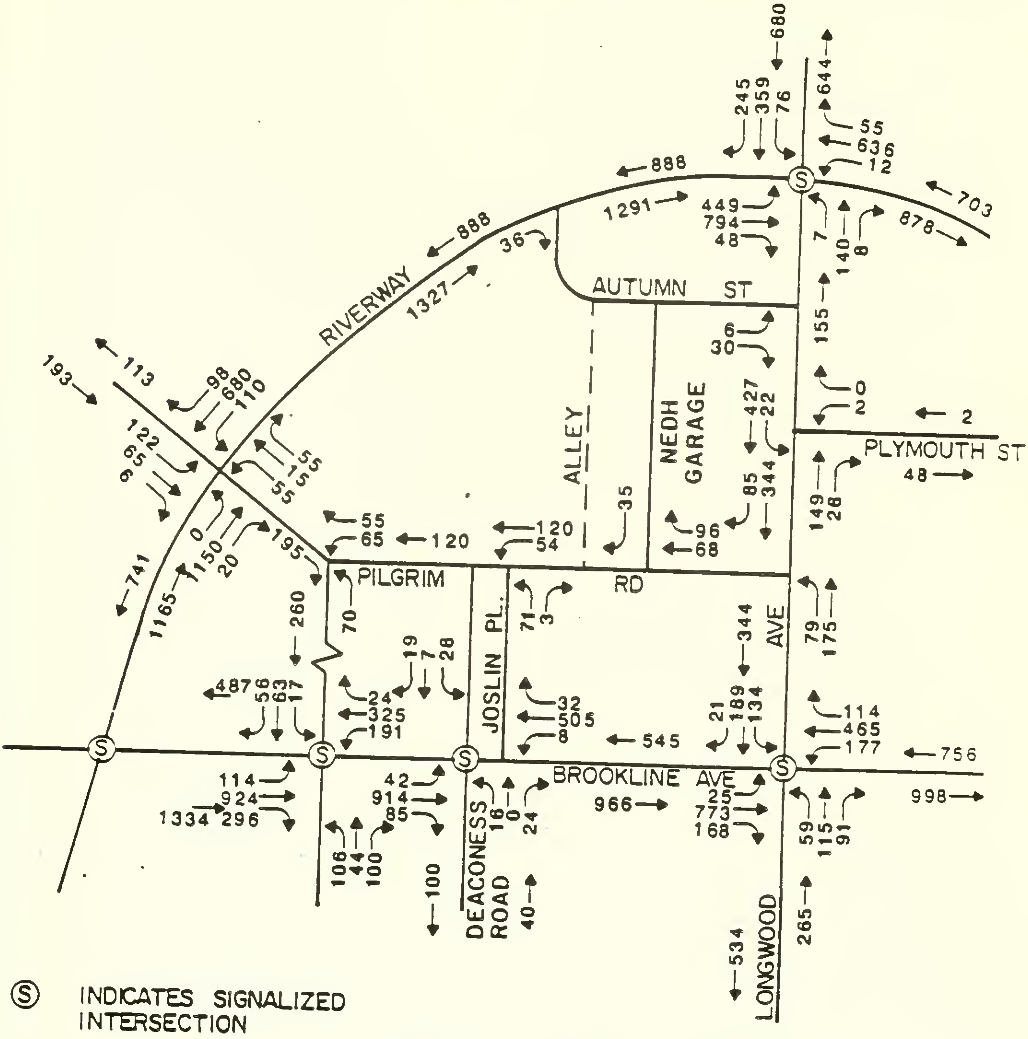
Manual Turning Movement Locations (AM and PM peak periods)

1. Riverway/Francis Street
2. Pilgrim Road/Francis Street
3. Pilgrim Road/Deaconess Road/Joslin Place
4. Brookline Avenue/Deaconess Road/Joslin Place
5. Pilgrim Road/NEDH Garage Access Road
6. Pilgrim Road/Longwood Avenue

In addition, a mechanical counting program yielded several peak period counts that were used to check those taken manually.

This new data, was combined with previously available traffic data to produce Figures 1 and 2. The figures define the existing AM and PM peak period traffic flow patterns in the study area. Table 2 summarizes the estimated daily traffic volume information for this study, along with a summary of peak period traffic volumes.

1518/586/trm



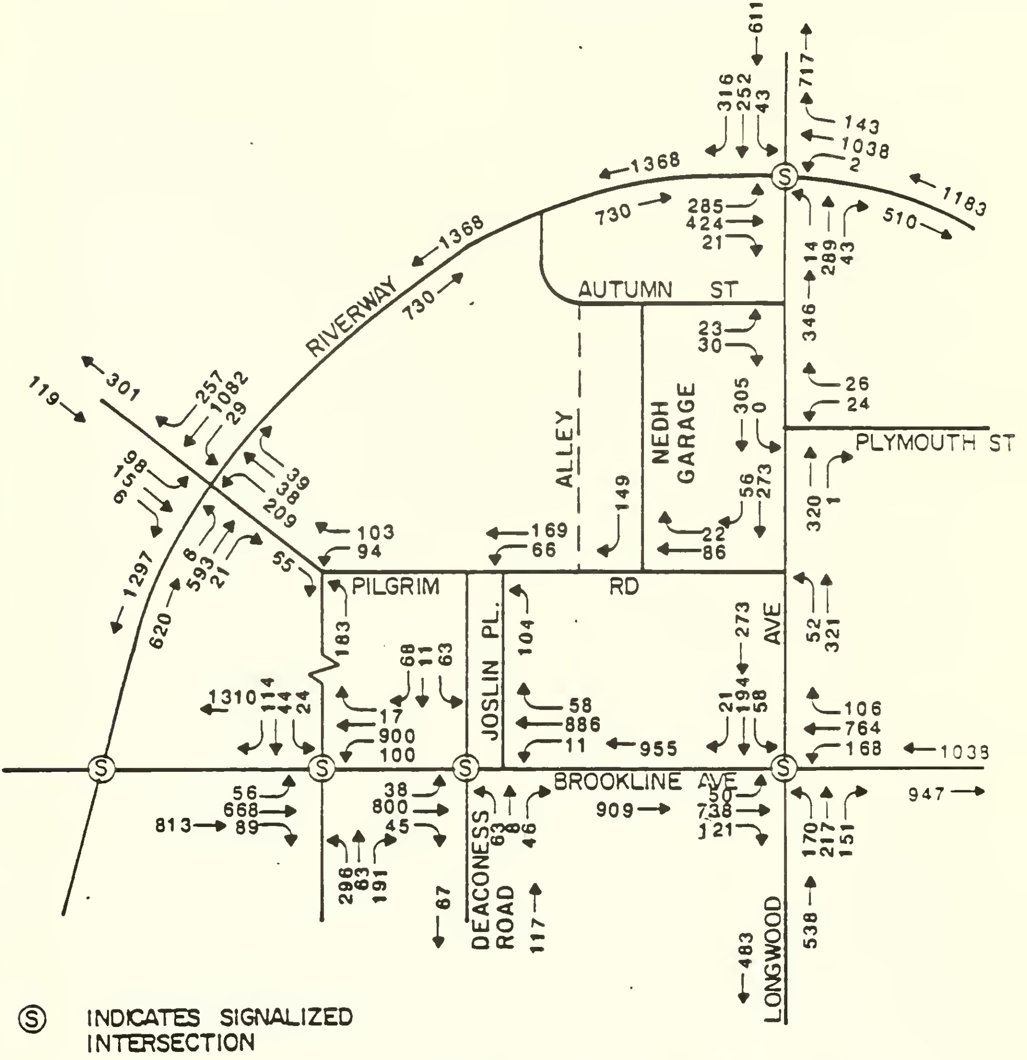
NOTE: Based primarily on volumes measured 4/85 and 5/86

Existing A.M. Peak Period Volumes

Vanasse/Hangen
Consulting Engineers & Planners
60 Birmingham Parkway Boston MA 02135

Not to Scale

Fig. 1



NOTE: Based primarily on volumes measured 4/85 and 5/86

Existing P.M. Peak Period Volumes

Vanasse/Hangen
Consulting Engineers & Planners
60 Birmingham Parkway Boston MA

Not to Scale

Fig. 2

Date: May 16, 1986
Ref: 1518

Table 2
Daily Traffic Volume summary

Location	ESTIMATED ADT*	AM Peak Hour** Volume	PM Peak Hour** Volume
Pilgrim Road just east of Joslin Place	2,700	177	235
Pilgrim Road east of Francis Street	2,100	120	197
Deaconess Road north of Brookline Avenue	1,300	54	142
Joslin Place north of Brookline Avenue	1,200	74	104
Francis Street between Pilgrim Rd & Riverway	3,700	320	351
Longwood Avenue between Binney & Blackfan Sts.	14,588***	999	1,025
Longwood Avenue between Pilgrim Rd & Brookline Ave.	9,000	598	646
Brookline Avenue north of Longwood Avenue	29,293***	1,754	1,985

* Average Daily Traffic - Estimate based on peak period turn volumes presented in Figures 1 and 2, except where *** indicates a different source.

** AM and PM Peak Volumes are reported from Figures 1 and 2. 7:30-8:30 AM and 4:00-5:00 PM represent the peak volume periods indicated in Figures 1 and 2.

*** September, 1983 data

1518/586/trm

A review of the data reveals several interesting findings. Probably of greatest interest are the volumes measured on Pilgrim Road itself, on the section proposed to be closed between Deaconess Road and Francis Street. On a daily basis, it is estimated that 2,100 vehicles per day (vpd) travel on this section. Peak hour volumes were found to be 120 and 197 vehicles during the AM and PM peak periods respectively. Obviously, these volumes are quite low in comparison to Brookline Avenue, the nearest adjacent parallel roadway which carries 1700 - 2000 vehicles per hour (vph) during the same periods.

Based on the volume measurements, it appears that during the morning peak, Pilgrim Road functions almost solely to provide direct access to adjacent institutions and parking with the NEDH garage being the prime generator of trips along the roadway. Through traffic traveling over the section to be closed is quite low and is estimated to be in the range of 25 - 50 vehicles.

The situation is quite similar during the afternoon peak, although the volumes are higher. It appears the the NEDH garage is again the major generator of Pilgrim Road traffic. During the afternoon, it appears that some drivers utilize Pilgrim Road as a southbound bypass of Brookline Avenue. Based on the counts presented in Figure 2, it is estimated that 25 - 50 vehicles on the section of Pilgrim Road to be closed are through vehicles.

Usage of Francis Street to enter or cross the Riverway traffic stream was found to be relatively high particularly during the PM peak when 286 vehicles were observed. The bulk of the vehicles using this roadway segment come from Francis Street; 103 were observed approaching from Pilgrim Road.

Origin - Destination Survey

In order to gather additional information on travel patterns along Pilgrim Road, an origin-destination survey was conducted during a one hour period in the afternoon peak when many drivers are exiting the area.

A total of 36 drivers were interviewed on Pilgrim Road at a point just west of Deaconess Road, near the drop off loop in front of the Deaconess Hospital's main entrance. Based on an afternoon peak period volume of approximately 195 vehicles, this represents an 18 percent sample of drivers using this roadway.

The results were quite interesting — of the 36 interviews conducted, 31 drivers (or 86%) indicated that they had at least one trip end at the Deaconess or the Joslin Diabetes Center. Table 2 summarizes the findings:

Table 2
Origin-Destination Survey Results

Origins	
Deaconess Garage	10
Joslin Diabetes Center	3
Deaconess Hospital	2
Boston Locations	11
Other Communities	10
Total	36

Destinations	
Deaconess Garage	6
Deaconess Hospital	10
Boston Locations	5
Other Communities	15
Total	36

These findings, combined with the results of the traffic count observations clearly indicate the predominance of local Deaconess oriented traffic on Pilgrim Road. Of the surveys conducted, only 14 percent of the drivers could be classified as through vehicles - that is those who don't have a trip end at an institution abutting Pilgrim Road. These findings support the estimates of through traffic developed in the previous section of this memorandum.

Analysis of the Impact of Closing a Portion of Pilgrim Road

There is precedent for closing Pilgrim Road, in fact a section north of Longwood Avenue was closed several years ago and has been absorbed by the Winsor School. Similarly, Children's Hospital recently modified the street pattern around its Blackfan Building by closing Blackfan Street and Children's Way to through traffic.

Based on the results of the traffic counts, it does not appear that the proposed closure would significantly affect traffic flow in the LMA. Based on current usage levels during the busiest period of the day, fewer than 200 vehicles would be rerouted. The potential closing is enhanced by two key points:

1. Most of the drivers on Pilgrim Road are attracted to the area by NEDH and are not through drivers, and

2. Pilgrim Road is currently one way and the proposed closure will have a lesser impact than if the street carried two way traffic.

A significant portion of the traffic now using Pilgrim Road turns left onto Francis Street in order to reach the 10 Francis Garage or Brookline Avenue. These drivers would now be forced to exit onto Brookline Avenue via Deaconess Road, resulting in a small increase in delay at this signal. NEDH traffic now exiting Pilgrim Road to Francis Street would also be reduced, creating safer operations at the Francis Street/Riverway intersection. Under the current road pattern all drivers would be diverted to Deaconess Road to travel on Brookline Avenue to reach their ultimate destinations.

Conclusion

Based on the results of this study, several conclusions can be drawn:

- Pilgrim Road currently carries a relatively low volume of traffic, most of which is primarily affiliated with NEDH.
- Peak hour volumes on the section of Pilgrim Road proposed to be closed range from 120 vehicles per hour (vph) during the AM peak hour to 197 vph during the PM peak.
- On a daily basis, an estimated 2,100 vehicles per day (vpd) would be affected by the proposed closing of Pilgrim Road.
- The bulk of Pilgrim Road traffic would divert to Deaconess Road and would then proceed either east or west on Brookline Avenue. It is not expected that these diversions will significantly increase the amount of traffic at any of the area's signalized intersections.
- One of the major generators of traffic on Pilgrim Road is the NEDH garage and only 25 - 50 vehicles during either peak period can be considered through vehicles.
- The proposed closure could improve operations at the unsignalized intersection of Joslin Place and Brookline Avenue since the number of turns, particularly left turns into Joslin Place would be reduced to only those drivers dropping off at the relocated Deaconess main entrance.
- Closing Pilgrim Road would reduce the amount of traffic that would exit from Francis Street onto the Riverway. This location is currently unsignalized and based on the Riverway volumes, exiting from this point is extremely difficult, particularly for vehicles turning left or traveling straight out of Francis Street.
- The closure would eliminate pedestrian/vehicle conflicts on Pilgrim Road itself.

Based on the preceding findings, it does not appear that the closing of Pilgrim Road proposed by Payette Associates for the New England Deaconess Hospital will significantly affect traffic flow in the immediate study area proximate to the site.

1518/586/trm

This report has not evaluated the potential transportation impacts of the proposed building project itself, nor has it developed mitigation measures or an access plan for the project.

cc: Hugh Sycamore, NEDH
Larry Koff, BRA
Bob Kroin, BRA
Phil Caruso, BTD

1518/586/trm

APPENDIX
-- Origin Destination Survey Results

NEW ENGLAND DEACONESS HOSPITAL
PILGRIM ROAD
ORIGIN/DESTINATION SUMMARY

Deaconess Garage	10	Deaconess Garage	6
Joslin Diabetes Center	3	Deaconess Hospital	10
Hyde Park	2	Dedham	3
Cambridge	1	Medway	1
Deaconess School of Nursing	1	Melrose	1
Rego Bros. Pharmacy	1	Brockton	1
West Roxbury	1	Longwood Pharmacy	1
Roxbury	1	Walpole	1
Windsor School	1	Wellesley	1
Waltham	1	West Roxbury	1
Children's Hospital	1	Marshfield	1
Deaconess Hospital	1	West Bridgewater	1
E. Greenwich, CN	1	Randolph	1
Salisbury	1	Framingham	1
Westwood	1	Canton	1
Brookline	1	Marshfield	1
Dedham	1	Longwood, Riverway	1
Natick	1	Newton	1
MDC Police Base	1	Roslindale	1
Jamaica Plain	1	Park Square	1
Somerville	1		
Cape Cod	1		
Brookline Avenue	1		
Roslindale	1		
Total Motorists Interviewed	36		36

Was the trip a part of visit to N.E. Deaconess?	Yes	No	Total
	31	5	36

Survey conducted May 6, 1986 between 4:00 - 5:00 PM on the one way westbound section of Pilgrim Road at a location just west of Deaconess Road.

CAPACITY CALCULATIONS

NOTE: EXISTING + PROJECT =
PILGRIM RD. CLOSED

```
NCH PROGRAM VERSION DATE 2-6-1987
85 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ACONESS HOSPITAL
OOKLINE/FRANCIS/AM/EXISTING
te:08-03-1987                 time:20:48:38
ST DATA SET NAMES LOADED OR SAVED
LUME=BRFRAME    GEOMETRICS=BRKFR          SIGNAL=BRKFR
CATED IN CBD:Y
LUME % GEOMETRICS
      VOLUMES          # OF LANES       LANE WIDTH        CROSS
R   LT    TH    RT     LT TH RT        LT   TH    RT      WALK
    17    63    56     0  1  0        0.0 12.0   0.0       0
   106    44   100     0  1  0        0.0 12.0   0.0       0
   114   924   296     0  2  1        0.0 12.0  12.0       0
   191   325    24     0  2  0        0.0 12.0   0.0       0

AFFIC % ROADWAY CONDITIONS
                ADJ PARK                    PEDESTRIANS           ARR
R GRADE %HV    Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME  TYPE
   0.0%   0.0%   N     0     0   .900   0            7.0     3
   0.0%   0.0%   N     0     0   .900   0            7.0     3
   0.0%   0.0%   N     0     0   .900   0            7.0     3
   0.0%   0.0%   N     0     0   .900   0            7.0     3

ASINGS
  EASTBOUND    WESTBOUND     NORTHBOUND    SOUTHBOUND  GREEN   Y+R  PRE/ACT
  l  t  r  p   l  t  r  p   l  t  r  p   l  t  r  p
  *  *  *      *  *  *
                                                       27.4    3     A
                            *  *  *      *  *  *       78.6    3     A

CLE= 112.0

LUME ADJUSTMENT WORKSHEET
RT 1 (MOVEMENT ADJUSTMENTS)
=  LTV   THV   RTV    PHF   LTFR  THFR  RTFR
    17    63    56   .900    19    70    62
   106    44   100   .900   118    49   111
   114   924   296   .900   127  1027   329
   191   325    24   .900   212   361    27

RT 2 (LANE GROUP ADJUSTMENTS)
= LN GROUP   FLOW N   LU     v   Plt  Prt
  LT-TH-RT    151 1  1.00   151 0.13 0.41
  LT-TH-RT    278 1  1.00   278 0.42 0.40
  LT-TH      1153 2  1.05  1211 0.11 0.00
  RT          329 1  1.00   329 0.00 1.00
  LT-TH-RT    600 2  1.05   630 0.35 0.04

RT 3 (OPPOSING VOLUME ADJUSTMENTS)
FT TURN                      OPPOSING APPROACH
ING OPPOSED          VOLUMES       % OPPOSING LEFT TURN     # LANES       OPPOSING
                   LT    TH    RT       LT    TH    RT      LT  TH  RT      VOLUME
STBOUND           118    49   111      100   100   100       0   1   0        160
STBOUND            19    70    62      100   100   100       0   1   0        173
RTHBOUND          212   361    27      100   100   100       0   2   0        600
UTHBOUND          127  1027   329      100   100     0       0   2   1       1153
```

```
LN GROUP    IDEAL N   Fwid    Fhv    Fgr  Fpark   Fbus  Farea    Frt    Flt     s
LT-TH-RT    1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.844 0.934 1278
LT-TH-RT    1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.846 0.818 1120
LT-TH       1800  2 1.000 1.000 1.000 1.000 1.000 0.900 1.000 0.525 1702
RT          1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.850 1.000 1377
LT-TH-RT    1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.993 0.577 1858

LEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
JT VARIABLES
  C    G   N    Va    Vm   Vlt   Flt No    Vo Flto
 12   27   1   151   132    19 0.13  1   160 0.42
 12   27   1   278   160   118 0.42  1   132 0.13
 12   79   2 1153  1399   127 0.11  2   600 0.35
 12   79   2   600   600   212 0.35  2  1153 0.11
CULATIONS
 Sop     Yo      Gu      Fs      Pl      Gq     Pt      Gf         El      Fm     Flt
1528 0.105 17.505 0.775 0.125  9.895 0.875  6.769     1.452 0.934 0.934
1704 0.078 20.282 0.792 0.424  7.118 0.576  2.336     1.420 0.818 0.818
   6 1.000  0.000 0.500 1.000 78.600 0.000  0.000     2.250 0.051 0.525
3165 0.364 59.456 0.154 1.000 19.145 0.000  0.000     7.297 0.155 0.577

ACITY ANALYSIS WORKSHEET
 LN GROUP     v     s   v/s  g/C     c  v/c  CRITICAL
 LT-TH-RT   151  1278 0.12 0.24   313 0.48
 LT-TH-RT   278  1120 0.25 0.24   274 1.01       *
 LT-TH     1211  1702 0.71 0.70  1195 1.01       *
 RT         329  1377 0.24 0.70   966 0.34
 LT-TH-RT   630  1858 0.34 0.70  1304 0.48

LE=112.0  LOST= 6.0  SUM V/S CRIT= 0.96 TOTAL V/C= 1.01

EL OF SERVICE WORKSHEET
 LN GROUP  v/c  g/C    C      d1     c       d2   PF     Delay LOS Avg Q  95% Q
 LT-TH-RT 0.48 0.24 112.0  27.54   313    0.95 0.85    24.22   C    3.6
 LT-TH-RT 1.01 0.24 112.0  32.29   274   45.65 0.85    66.24   F    8.4
 LT-TH    1.01 0.70 112.0  13.11  1195   23.26 0.85    30.92   D   15.7
 RT       0.34 0.70 112.0   4.97   966    0.09 0.85     4.30   A    3.1
 LT-TH-RT 0.48 0.70 112.0   5.73  1304    0.23 0.85     5.06   B    5.6

 Delay LOS
 24.22  C
 66.24  F
 25.23  D
  5.06  B
ERSECTION DELAY = 24.67 INTERSECTION LOS=C

 CYCLE LENGTH WITHIN THE BOUNDS OF  40   TO   120 SECONDS
 CH MINIMIZES CRITICAL MOVEMENT DELAY IS 112.0 SECONDS

 V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
 EXISTING TIMING IS OPTIMAL
```

```
CM PROGRAM VERSION DATE 2-6-1987
85 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ACONESS HOSPITAL
OOKLINE/FRANCIS/AM/EXISTING+PROJECT
te:08-03-1987              time:20:53:15
ST DATA SET NAMES LOADED OR SAVED
LUME=BRFRAME    GEOMETRICS=BRKFR       SIGNAL=BRKFR
CATED IN CBD:Y
LUME & GEOMETRICS
       VOLUMES           # OF LANES       LANE WIDTH        CROSS
R  LT     TH     RT     LT  TH  RT     LT    TH    RT      WALK
   17     63     33      0   1   0    0.0  12.0   0.0       0
  106     44    100      0   1   0    0.0  12.0   0.0       0
  114    924    296      0   2   1    0.0  12.0  12.0       0
  191    349     24      0   2   0    0.0  12.0   0.0       0

AFFIC & ROADWAY CONDITIONS
                  ADJ PARK                    PEDESTRIANS           ARR
R GRADE  %HV    Y/N MOVES BUSES  PHF  CROSS BUT MIN  TIME  TYPE
  0.0%   0.0%    N     0     0   .900     0            7.0     3
  0.0%   0.0%    N     0     0   .900     0            7.0     3
  0.0%   0.0%    N     0     0   .900     0            7.0     3
  0.0%   0.0%    N     0     0   .900     0            7.0     3

ASINGS
  EASTBOUND     WESTBOUND     NORTHBOUND    SOUTHBOUND GREEN   Y+R  PRE/ACT
  l  t  r  p    l  t  r  p    l  t  r  p    l  t  r  p
  *  *  *       *  *  *
                                                        24.7    3     A
                              *  *  *       *  *  *     75.3    3     A

CLE= 106.0

LUME ADJUSTMENT WORKSHEET
RT 1 (MOVEMENT ADJUSTMENTS)
R  LTV   THV   RTV    PHF   LTFR  THFR RTFR
    17    63    33   .900     19    70   36
   106    44   100   .900    118    49  111
   114   924   296   .900    127  1027  329
   191   349    24   .900    212   388   27

RT 2 (LANE GROUP ADJUSTMENTS)
R LN GROUP   FLOW N    LU     v   Plt  Prt
  LT-TH-RT    124 1 1.00   124 0.15 0.29
  LT-TH-RT    278 1 1.00   278 0.42 0.40
  LT-TH      1153 2 1.05  1211 0.11 0.00
  RT          329 1 1.00   329 0.00 1.00
  LT-TH-RT    627 2 1.05   658 0.34 0.04

RT 3 (OPPOSING VOLUME ADJUSTMENTS)
FT TURN                      OPPOSING APPROACH
ING OPPOSED            VOLUMES          % OPPOSING LEFT TURN     # LANES      OPPOSING
                   LT     TH     RT        LT     TH     RT      LT  TH  RT     VOLUME
STBOUND           118     49    111       100    100    100       0   1   0      160
STBOUND            19     70     36       100    100    100       0   1   0      106
RTHBOUND          212    388     27       100    100    100       0   2   0   [illegible]
```

```
TION FLOW ADJUSTMENT WORKSHEET
 GROUP   IDEAL N   Fwid    Fhv    Fgr  Fpark   Fbus  Farea    Frt    Flt     S
-TH-RT   1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.861 0.917 1279
-TH-RT   1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.846 0.870 1192
-TH      1800  2 1.000 1.000 1.000 1.000 1.000 0.900 1.000 0.527 1706
         1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.850 1.000 1377
-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.994 0.579 1864

EMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
 VARIABLES
     G   N    Va    Vm   Vlt  Plt No    Vo Plto
6   25   1   124   106    19 0.15  1   160 0.42
6   25   1   278   160   118 0.42  1   106 0.15
6   75   2 1153 1399   127 0.11  2   627 0.34
6   75   2   627   627   212 0.34  2 1153 0.11
LATIONS
op     Yo      Gu     Fs     Pl      Gq     Pt      Gf        El     Fm    Flt
44 0.104 15.317 0.775 0.152  9.396 0.848  6.019     1.452 0.917 0.917
85 0.063 19.278 0.809 0.424  5.434 0.576  2.110     1.391 0.870 0.870
 6 1.000  0.000 0.483 1.000 75.288 0.000  0.000     2.328 0.053 0.527
42 0.367 57.475 0.154 1.000 17.812 0.000  0.000     7.297 0.158 0.579

ITY ANALYSIS WORKSHEET
N GROUP      v     s  v/s  g/C     c  v/c  CRITICAL
T-TH-RT   124 1279 0.10 0.23   298 0.42
T-TH-RT   278 1192 0.23 0.23   278 1.00       *
LT-TH    1211 1706 0.71 0.71 1212 1.00       *
RT        329 1377 0.24 0.71   978 0.34
LT-TH-RT  658 1864 0.35 0.71 1324 0.50

E=106.0  LOST= 6.0  SUM V/S CRIT= 0.94 TOTAL V/C= 1.00

L OF SERVICE WORKSHEET
 LN GROUP  v/c  g/C     C      d1     c       d2   PF   Delay LOS Avg Q  95% Q
 LT-TH-RT 0.42 0.23 106.0  26.24   298     0.57 0.85   22.79  C    2.8
 LT-TH-RT 1.00 0.23 106.0  30.88   278    41.34 0.85   61.39  F    7.9
 LT-TH    1.00 0.71 106.0  11.65 1212    19.74 0.85   26.68  D   13.5
 RT       0.34 0.71 106.0   4.44   978     0.08 0.85    3.84  A    2.8
 LT-TH-RT 0.50 0.71 106.0   5.23 1324     0.25 0.85    4.66  A    5.3

 Delay LOS
 22.79  C
 61.39  F
 21.81  C
  4.66  A
ERSECTION DELAY = 21.74 INTERSECTION LOS=C

 CYCLE LENGTH WITHIN THE BOUNDS OF  40  TO  0 SECONDS
CH MINIMIZES CRITICAL MOVEMENT DELAY IS 106.0 SECONDS

 A V/C RATIO OF .95 THE CYCLE SHOULD BE 792.8 SECONDS
E EXISTING TIMING IS OPTIMAL
```

```
CH PROGRAM VERSION DATE 2-6-1987
5 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
CONESS HOSPITAL
OKLINE/FRANCIS/PM/EXISTING
e:08-03-1987                  time:21:00:19
T DATA SET NAMES LOADED OR SAVED
UME=BRFRPME    GEOMETRICS=BRKFR        SIGNAL=BRKFR
ATED IN CBD:Y
UME & GEOMETRICS
     VOLUMES          # OF LANES       LANE WIDTH       CROSS
  LT    TH   RT     LT  TH  RT       LT    TH    RT     WALK
   24    44  114     0   1   0       0.0 12.0   0.0      0
  296    63  191     0   1   0       0.0 12.0   0.0      0
   56   668   89     0   2   1       0.0 12.0  12.0      0
  100   900   17     0   2   0       0.0 12.0   0.0      0

AFFIC & ROADWAY CONDITIONS
                ADJ PARK                PEDESTRIANS          ARR
 GRADE  %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME  TYPE
  0.0%  0.0%   N     0     0   .900    0          7.0     3
  0.0%  0.0%   N     0     0   .900    0          7.0     3
  0.0%  0.0%   N     0     0   .900    0          7.0     3
  0.0%  0.0%   N     0     0   .900    0          7.0     3

ASINGS
  EASTBOUND   WESTBOUND   NORTHBOUND   SOUTHBOUND  GREEN   Y+R  PRE/ACT
  l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
  *  *  *     *  *  *                               57.7    3     A
                          *  *  *     *  *  *       56.3    3     A

CLE= 120.0

UME ADJUSTMENT WORKSHEET
RT 1 (MOVEMENT ADJUSTMENTS)
R   LTV   THV   RTV    PHF   LTPF  THFR  RTFR
     24    44   114   .900     27    49   127
    296    63   191   .900    329    70   212
     56   668    89   .900     62   742    99
    100   900    17   .900    111  1000    19

RT 2 (LANE GROUP ADJUSTMENTS)
R  LN GROUP   FLOW N    LU      v   Plt   Prt
   LT-TH-RT    202 1  1.00    202 0.13  0.63
   LT-TH-RT    611 1  1.00    611 0.54  0.35
   LT-TH       904 2  1.05    845 0.08  0.00
   RT           99 1  1.00     99 0.00  1.00
   LT-TH-RT   1130 2  1.05   1187 0.10  0.02

RT 3 (OPPOSING VOLUME ADJUSTMENTS)
FT TURN                   OPPOSING APPROACH
ING OPPOSED          VOLUMES        % OPPOSING LEFT TURN      # LANES       OPPOSING
                  LT    TH    RT        LT    TH    RT        LT   TH   RT      VOLUME
STBOUND          329    70   212       100   100   100         0    1    0        282
STBOUND           27    49   127       100   100   100         0    1    0        176
RTHBOUND         111  1000    19       100   100   100         0    2    0       1130
UTHBOUND          62   742    99       100   100
```

```
ATURATION FLOW ADJUSTMENT WORKSHEET
IR LN GROUP   IDEAL N  Fwid    Fhv    Fgr Fpark  Fbus Farea    Frt    Flt     s
F  LT-TH-RT   1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.915 0.871 1150
B  LT-TH-RT   1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.853 0.778 1075
B  LT-TH      1800  2 1.000 1.000 1.000 1.000 1.000 0.900 1.000 0.564 1828
B  RT         1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.850 1.000 1377
B  LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.997 0.662 2139

UPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
NPUT VARIABLES
IR  C    G   N    Va    Vm   Vlt   Plt No    Vo Plto
B 120   58   1   202   176    27 0.13  1   282 0.54
B 120   58   1   611   282   329 0.54  1   176 0.13
B 120   56   2   804   903    62 0.08  2  1130 0.10
B 120   56   2  1130  1130   111 0.10  2   804 0.08
ALCULATIONS
IR Sop     Yo      Gu     Fs     Fl      Gq     Pt      Gf         El     Fm    Flt
B 1437 0.196 42.476 0.699 0.132 15.230 0.868   8.681      1.610 0.871 0.871
B 1666 0.105 50.368 0.765 0.538  7.338 0.462   1.615      1.470 0.778 0.778
B 2862 0.395 14.721 0.169 0.701 41.573 0.299   0.854      6.667 0.128 0.564
B 2503 0.321 26.122 0.372 0.488 30.172 0.512   2.102      3.022 0.324 0.662

APACITY ANALYSIS WORKSHEET
IR LN GROUP      v     s  v/s  g/C     c  v/c  CRITICAL
B  LT-TH-RT   202 1150 0.18 0.48   553 0.37
B  LT-TH-RT   611 1075 0.57 0.48   517 1.18        *
B  LT-TH      845 1828 0.46 0.47   857 0.99
B  RT          99 1377 0.07 0.47   646 0.15
B  LT-TH-RT 1187 2139 0.55 0.47  1004 1.18        *

YCLE=120.0  LOST= 6.0  SUM V/S CRIT= 1.12 TOTAL V/C= 1.18

EVEL OF SERVICE WORKSHEET
IR LN GROUP   v/c  g/C    C      d1     c       d2   PF    Delay LOS Avg Q  95%
B  LT-TH-RT 0.37 0.48 120.0  14.91   553     0.19 0.85    12.84  B    3.5
B  LT-TH-RT 1.18 0.48 120.0  28.47   517   107.81 0.85   115.84  F   25.0
B  LT-TH    0.99 0.47 120.0  23.89   857    20.41 0.85    37.66  D   15.5
B  RT       0.15 0.47 120.0  13.85   646     0.01 0.85    11.78  B    1.7
B  LT-TH-RT 1.18 0.47 120.0  28.86 1004    99.27 0.85   108.90  F   44.2

IR Delay LOS
B   12.84  B
B  115.84  F
B   34.95  D
B  108.90  F
NTERSECTION DELAY = 80.04 INTERSECTION LOS=F

HE CYCLE LENGTH WITHIN THE BOUNDS OF  40  TO  120 SECONDS
HICH MINIMIZES CRITICAL MOVEMENT DELAY IS 120.0 SECONDS

HE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
HE EXISTING TIMING IS OPTIMAL
```

```
NCH PROGRAM VERSION DATE 2-6-1987
35 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ACONESS HOSPITAL
OOKLINE/FRANCIS/PM/EXISTING+PROJECT
te:08-03-1987                 time:21:06:34
ST DATA SET NAMES LOADED OR SAVED
UME=BRFRPMEP   GEOMETRICS=BRKFR        SIGNAL=BRKFR
CATED IN CBD:Y
UME & GEOMETRICS
      VOLUMES        # OF LANES      LANE WIDTH      CROSS
  LT    TH    RT     LT TH RT       LT    TH    RT     WALK
   24    24    39     0  1  0      0.0 12.0  0.0      0
  296    63   191     0  1  0      0.0 12.0  0.0      0
   56   668    89     0  2  1      0.0 12.0 12.0      0
  100   995    17     0  2  0      0.0 12.0  0.0      0

AFFIC & ROADWAY CONDITIONS
               ADJ PARK                  PEDESTRIANS        ARR
 GRADE  %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME  TYPE
  0.0%  0.0%   N     0     0   .900    0          7.0     3
  0.0%  0.0%   N     0     0   .900    0          7.0     3
  0.0%  0.0%   N     0     0   .900    0          7.0     3
  0.0%  0.0%   N     0     0   .900    0          7.0     3

ASINGS
 EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND  GREEN   Y+R  PRE/ACT
 l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 *  *  *     *  *  *                               51.1    3     A
                         *  *  *     *  *  *       62.9    3     A

CLE= 120.0

UME ADJUSTMENT WORKSHEET
RT 1 (MOVEMENT ADJUSTMENTS)
   LTV   THV   RTV    PHF   LTFR THFR RTFR
    24    24    39   .900    27   27   43
   296    63   191   .900   329   70  212
    56   668    89   .900    62  742   99
   100   995    17   .900   111 1106   19

RT 2 (LANE GROUP ADJUSTMENTS)
 LN GROUP   FLOW N    LU     v  Plt  Prt
 LT-TH-RT     97 1  1.00    97 0.28 0.45
 LT-TH-RT    611 1  1.00   611 0.54 0.35
 LT-TH       804 2  1.05   845 0.08 0.00
 RT           99 1  1.00    99 0.00 1.00
 LT-TH-RT   1236 2  1.05  1297 0.09 0.02

RT 3 (OPPOSING VOLUME ADJUSTMENTS)
FT TURN                    OPPOSING APPROACH
NG OPPOSED           VOLUMES          % OPPOSING LEFT TURN      # LANES       OPPOSING
                 LT    TH    RT        LT    TH    RT         LT  TH  RT       VOLUME
STBOUND         329    70   212       100   100   100          0   1   0        282
STBOUND          27    27    43       100   100   100          0   1   0         70
THBOUND         111  1106    19       100   100   100          0   2   0       1074
THBOUND          62   742    99       100   100     0          0
```

```
URATION FLOW ADJUSTMENT WORKSHEET
 LN GROUP   IDEAL N  Fwid    Fhv    Fgr Fpark   Fbus Farea    Frt    Flt     s
 LT-TH-RT   1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.839 0.736 1001
 LT-TH-RT   1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.853 0.871 1203
 LT-TH      1800  2 1.000 1.000 1.000 1.000 1.000 0.900 1.000 0.551 1785
 RT         1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.850 1.000 1377
 LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.998 0.642 2075

PLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
UT VARIABLES
  C    G  N    Va    Vm   Vlt  Plt No    Vo Plto
 120  51  1    97    70    27 0.28  1   282 0.54
 120  51  1   611   282   329 0.54  1    70 0.28
 120  63  2   804   903    62 0.08  2 1236 0.09
 120  63  2 1236 1236   111 0.09  2   804 0.08
.CULATIONS
R Sop    Yo     Gu     Fs     Pl     Gq     Pt     Gf         El     Fm    Flt
 1512 0.187 35.288 0.699 0.276 15.808 0.724  4.841     1.610 0.736 0.736
 1541 0.045 47.816 0.831 0.538  3.280 0.462  1.233     1.353 0.871 0.871
 2913 0.424 20.840 0.103 0.810 42.064 0.190  0.469    10.946 0.102 0.351
 2035 0.395 25.570 0.372 0.493 37.334 0.507  2.053     3.022 0.284 0.642

PACITY ANALYSIS WORKSHEET
R LN GROUP     v     s  v/s  g/C    c  v/c  CRITICAL
  LT-TH-RT    97  1001 0.10 0.43  426 0.23
  LT-TH-RT   611  1203 0.51 0.43  512 1.19      *
  LT-TH      845  1785 0.47 0.52  935 0.90
  RT          99  1377 0.07 0.52  722 0.14
  LT-TH-RT  1297  2075 0.63 0.52 1088 1.19      *

CLE=120.0  LOST= 6.0  SUM V/S CRIT= 1.13 TOTAL V/C= 1.19

VEL OF SERVICE WORKSHEET
R LN GROUP  v/c  g/C    C      d1     c      d2   PF   Delay LOS Avg Q  95% Q
  LT-TH-RT 0.23 0.43 120.0   16.64   426    0.05 0.85   14.19  B    1.9
  LT-TH-RT 1.19 0.43 120.0   30.55   512  114.60 0.85  123.38  F   26.8
  LT-TH    0.90 0.52 120.0   19.60   935    8.55 0.85   23.93  C   12.8
  RT       0.14 0.52 120.0   11.12   722    0.01 0.85    9.46  B    1.6
  LT-TH-RT 1.19 0.52 120.0   27.55  1088  105.12 0.85  112.77  F   48.5

R Delay LOS
   14.19  B
  123.38  F
   22.41  C
  112.77  F
TERSECTION DELAY = 82.82 INTERSECTION LOS=F

E CYCLE LENGTH WITHIN THE BOUNDS OF  40  TO  120 SECONDS
ICH MINIMIZES CRITICAL MOVEMENT DELAY IS 120.0 SECONDS

E V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
E EXISTING TIMING IS OPTIMAL
```

```
NCH PROGRAM VERSION DATE 2-6-1987
85 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ACONESS HOSPITAL
OCK LINE/DEACONESS/AM/EXISTING
te:08-03-1987                  time:21:33:28
ST DATA SET NAMES LOADED OR SAVED
LUME=BRDJAME    GEOMETRICS=BRDJ         SIGNAL=BRKFR
CATED IN CBD:Y
LUME & GEOMETRICS
      VOLUMES          # OF LANES      LANE WIDTH      CROSS
R  LT    TH    RT     LT TH RT       LT   TH    RT     WALK
   28     7    19      0  2  0      0.0 12.0   0.0      0
   16     0    24      0  1  0      0.0 12.0   0.0      0
   42   914    85      0  2  0      0.0 12.0   0.0      0
    8   505    32      0  2  0      0.0 12.0   0.0      0

AFFIC & ROADWAY CONDITIONS
               ADJ PARK                  PEDESTRIANS         ARR
R GRADE %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME  TYPE
  0.0%  0.0%   N      0     0   .900    0          7.0     3
  0.0%  0.0%   N      0     0   .900    0          7.0     3
  0.0%  0.0%   N      0     0   .900    0          7.0     3
  0.0%  0.0%   N      0     0   .900    0          7.0     3

ASINGS
  EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND GREEN  Y+R PRE/ACT
  l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
  *  *  *     *  *  *                                4.2   3    A
                          *  *  *     *  *  *      49.8   3    A

CLE=  60.0

LUME ADJUSTMENT WORKSHEET
RT 1 (MOVEMENT ADJUSTMENTS)
R   LTV   THV   RTV   PHF  LTFR THFR RTFR
     28     7    19  .900    31    8   21
     16     0    24  .900    18    0   27
     42   914    85  .900    47 1016   94
      8   505    32  .900     9  561   36

RT 2 (LANE GROUP ADJUSTMENTS)
R LN GROUP   FLOW N    LU      v  Flt  Frt
  LT-TH-RT     60 2 1.05     63 0.52 0.35
  LT-RT        44 1 1.00     44 0.40 0.60
  LT-TH-RT   1157 2 1.05   1215 0.04 0.08
  LT-TH-RT    606 2 1.05    636 0.01 0.06

RT 3 (OPPOSING VOLUME ADJUSTMENTS)
EFT TURN                    OPPOSING APPROACH
EING OPPOSED          VOLUMES         % OPPOSING LEFT TURN       # LANES       OPPOSING
                 LT    TH    RT        LT    TH    RT         LT   TH   RT      VOLUME
ASTBOUND         18     0    27       100   100   100          0    1    0         27
ESTBOUND         31     8    21       100   100   100          0    2    0         60
ORTHBOUND         9   561    36       100   100   100          0    2    0        606
OUTHBOUND        47  1016    94       100   100   100          0    2    0       1157
```

```
 GROUP   IDEAL N  Fwid    Fhv    Fgr Fpark  Fbus Farea   Frt   Flt     s
-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.947 1.000 3069
-RT      1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.819 1.000 1327
-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.988 0.960 3074
-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.991 0.864 2773

MENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
VARIABLES
    G   N    Va    Vm   Vlt   Plt No    Vo Plto
    4   2    60    60    31 0.52  1    27 0.40
    4   1    44    27    18 0.40  2    60 0.52
   50   2  1157  1157    47 0.04  2   606 0.01
   50   2   606   606     9 0.01  2  1157 0.04
ATIONS
op     Yo       Gu     Fs     Pl      Gq    Pt      Gf         El     Fm    Flt
33 0.017   3.264 0.858 0.818   0.956 0.182   0.248     1.311 1.000 1.000
01 0.019   3.119 0.838 1.000   1.101 0.000   0.000     1.343 1.000 1.000
91 0.184  47.475 0.497 0.112   2.305 0.888   2.029     2.266 0.921 0.960
25 0.338  44.569 0.152 0.079   5.211 0.921   4.496     7.397 0.727 0.864

ITY ANALYSIS WORKSHEET
N GROUP      v     s   v/s   g/C     c   v/c  CRITICAL
T-TH-RT     63  3069 0.02  0.07   216  0.29
T-RT        44  1327 0.03  0.07    93  0.48       *
T-TH-RT   1215  3074 0.40  0.83  2550  0.48       *
T-TH-RT    636  2773 0.23  0.83  2301  0.28

= 60.0  LOST= 6.0  SUM V/S CRIT= 0.43 TOTAL V/C= 0.48

L OF SERVICE WORKSHEET
N GROUP  v/c   g/C    C      d1     c       d2   PF    Delay LOS Avg Q  95% Q
LT-TH-RT 0.29 0.07  60.0  20.12   216      0.22 0.85   17.29  C    0.9
LT-RT    0.48 0.07  60.0  20.39    93      2.86 0.85   19.76  C    0.7
LT-TH-RT 0.48 0.83  60.0   1.09  2550      0.11 0.85    1.02  A    3.3
LT-TH-RT 0.28 0.83  60.0   0.86  2301      0.02 0.85    0.74  A    1.7

Delay LOS
17.29  C
19.76  C
 1.02  A
 0.74  A
RSECTION DELAY =  1.88 INTERSECTION LOS=A

 CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
H MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

 A V/C RATIO OF .95 THE CYCLE SHOULD BE  10.9 SECONDS
 EXISTING TIMING IS OPTIMAL
```

```
CH PROGRAM VERSION DATE 2-6-1987
S HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
CONESS HOSPITAL
OKLINE/DEACONESS/AM/EXISTING+PROJECT
e:08-03-1987                 time:21:36:48
T DATA SET NAMES LOADED OR SAVED
UME=BRDJAMEP   GEOMETRICS=BRDJ         SIGNAL=BRKFR
ATED IN CBD:Y
UME & GEOMETRICS
     VOLUMES         # OF LANES      LANE WIDTH      CROSS
  LT    TH    RT     LT  TH  RT       LT    TH    RT      WALK
  28     7    43      0   2   0      0.0  12.0   0.0       0
  16     0    24      0   1   0      0.0  12.0   0.0       0
  62   914    85      0   2   0      0.0  12.0   0.0       0
   8   517    32      0   2   0      0.0  12.0   0.0       0

FFIC & ROADWAY CONDITIONS
              ADJ PARK                    PEDESTRIANS          ARR
 GRADE %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME TYPE
 0.0%  0.0%   N      0     0   .900    0           7.0     3
 0.0%  0.0%   N      0     0   .900    0           7.0     3
 0.0%  0.0%   N      0     0   .900    0           7.0     3
 0.0%  0.0%   N      0     0   .900    0           7.0     3

SINGS
 EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND GREEN  Y+R PRE/ACT
 l  t  r  p   l  t  r  p   l  t  r  p   l  t  r  p
 *  *  *      *  *  *                                 4.0   3    A
                           *  *  *      *  *  *      50.0   3    A

LE=  60.0

UME ADJUSTMENT WORKSHEET
T 1 (MOVEMENT ADJUSTMENTS)
  LTV   THV   RTV    PHF  LTFR THFR RTFR
    28     7    43  .900    31    8   48
    16     0    24  .900    18    0   27
    62   914    85  .900    69 1016   94
     8   517    32  .900     9  574   36

T 2 (LANE GROUP ADJUSTMENTS)
 LN GROUP   FLOW N   LU     v  Plt  Prt
 LT-TH-RT     87 2 1.05    91 0.36 0.55
 LT-RT        44 1 1.00    44 0.40 0.60
 LT-TH-RT   1179 2 1.05  1238 0.06 0.08
 LT-TH-RT    619 2 1.05   650 0.01 0.06

T 3 (OPPOSING VOLUME ADJUSTMENTS)
T TURN                       OPPOSING APPROACH
NG OPPOSED          VOLUMES          % OPPOSING LEFT TURN      # LANES       OPPOSING
                  LT    TH    RT        LT    TH    RT        LT  TH  RT      VOLUME
STBOUND           18     0    27       100   100   100         0   1   0         27
STBOUND           31     8    48       100   100   100         0   2   0         87
RTHBOUND           9   574    36       100   100   100         0   2   0        619
STBOUND           69  1016    94       100   100   100
```

```
JRATION FLOW ADJUSTMENT WORKSHEET
 LN GROUP   IDEAL N   Fwid    Fhv    Fgr  Fpark   Fbus  Farea    Frt    Flt     s
 LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.917 1.000 2972
 LT-RT      1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.819 1.000 1327
 LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.988 0.975 2994
 LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.991 0.850 2729

PLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
JT VARIABLES
  C    G   N    Va    Vm   Vlt   Flt No    Vo Plto
 60    4   2    87    87    31 0.36  1    27 0.40
 60    4   1    44    27    18 0.40  2    87 0.36
 60   50   2 1179 1179    69 0.06  2   619 0.01
 60   50   2   619   619     9 0.01  2 1179 0.06
CULATIONS
 Sop      Yo       Gu     Fs     Pl       Gq     Pt      Gf         El     Fm    Flt
1568 0.017   3.079 0.858 0.562   0.968 0.438   0.513      1.311 1.000 1.000
3239 0.027   2.509 0.821 1.000   1.538 0.000   0.000      1.371 1.000 1.000
3265 0.190 47.603 0.488 0.164   2.350 0.836   1.936      2.304 0.871 0.935
3345 0.352 44.484 0.138 0.082   5.468 0.918   4.672      8.141 0.699 0.850

ACITY ANALYSIS WORKSHEET
 LN GROUP      v     s  v/s  g/C     c  v/c  CRITICAL
 LT-TH-RT    91 2972 0.03 0.07   200 0.45
 LT-RT       44 1327 0.03 0.07    90 0.50       *
 LT-TH-RT 1238 2994 0.41 0.83 2493 0.50       *
 LT-TH-RT   650 2729 0.24 0.83 2272 0.29

:LE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.45 TOTAL V/C= 0.50

/EL OF SERVICE WORKSHEET
 LN GROUP   v/c  g/C    C      d1     c        d2   PF    Delay LOS Avg Q  95% Q
  LT-TH-RT 0.45 0.07  60.0  20.45   200      1.15 0.85   18.36  C     1.3
  LT-RT     0.50 0.07  60.0  20.31    90      3.48 0.85   20.40  C     0.7
  LT-TH-RT 0.50 0.83  60.0   1.09 2493      0.13 0.85    1.04  A     3.3
  LT-TH-RT 0.29 0.83  60.0   0.34 2272      0.02 0.85    0.73  A     1.7

 Delay LOS
  18.36  C
  20.40  C
   1.04  A
   0.73  A
TERSECTION DELAY =  2.15 INTERSECTION LOS=A

E CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
ICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

R A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.3 SECONDS
E EXISTING TIMING IS OPTIMAL
```

```
INCH PROGRAM VERSION DATE 2-6-1987
985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
EACONESS HOSPITAL
ROOKLINE/DEACONESS/PM/EXISTING
ate:08-03-1987              time:21:40:42
AST DATA SET NAMES LOADED OR SAVED
OLUME=BRDJPME    GEOMETRICS=BRDJ       SIGNAL=BRKFR
OCATED IN CBD:Y
OLUME % GEOMETRICS
      VOLUMES          # OF LANES      LANE WIDTH       CROSS
IR  LT    TH    RT     LT  TH  RT      LT    TH    RT     WALK
B   63    11    68      0   2   0      0.0  12.0   0.0      0
B   63     8    46      0   1   0      0.0  12.0   0.0      0
B   38   800    45      0   2   0      0.0  12.0   0.0      0
B   11   886    58      0   2   0      0.0  12.0   0.0      0

RAFFIC % ROADWAY CONDITIONS
                ADJ PARK               PEDESTRIANS          ARR
IR GRADE %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME TYPE
B  0.0%  0.0%   N     0     0   .900    0           7.0     3
B  0.0%  0.0%   N     0     0   .900    0           7.0     3
B  0.0%  0.0%   N     0     0   .900    0           7.0     3
B  0.0%  0.0%   N     0     0   .900    0           7.0     3

HASINGS
   EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND  GREEN   Y+R  PRE/ACT
   l  t  r  p   l  t  r  p   l  t  r  p   l  t  r  p
1  *  *  *      *  *  *                                 10.4    3     A
2                            *  *  *      *  *  *       43.6    3     A

YCLE=  60.0

OLUME ADJUSTMENT WORKSHEET
ART 1 (MOVEMENT ADJUSTMENTS)
IR   LTV   THV   RTV    PHF   LTFR THFR RTFR
B     63    11    68   .900     70   12   76
B     63     8    46   .900     70    9   51
B     38   800    45   .900     42  889   50
B     11   886    58   .900     12  984   64

ART 2 (LANE GROUP ADJUSTMENTS)
IR LN GROUP   FLOW N   LU     v   Plt   Prt
B  LT-TH-RT    158 2 1.05   166 0.44 0.48
B  LT-TH-RT    130 1 1.00   130 0.54 0.39
B  LT-TH-RT    981 2 1.05  1030 0.04 0.05
B  LT-TH-RT   1061 2 1.05  1114 0.01 0.06

ART 3 (OPPOSING VOLUME ADJUSTMENTS)
EFT TURN                    OPPOSING APPROACH
EING OPPOSED         VOLUMES         % OPPOSING LEFT TURN      # LANES       OPPOSING
                  LT    TH    RT        LT    TH    RT        LT   TH   RT      VOLUME
ASTBOUND          70     9    51       100   100   100         0    1    0         50
ESTBOUND          70    12    76       100   100   100         0    2    0        158
ORTHBOUND         12   984    64       100   100   100         0    2    0       1061
OUTHBOUND         42   889    50       100   100   100         0    2
```

```
URATION FLOW ADJUSTMENT WORKSHEET
 LN GROUP   IDEAL N  Fwid   Fhv    Fgr Fpark  Fbus Farea   Frt    Flt     s
  LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.928 1.000 3007
  LT-TH-RT   1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.847 1.000 1372
  LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.993 0.804 2586
  LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.991 0.958 3076 .

PLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
UT VARIABLES
   C    G   N    Va    Vm   V1t   P1t No    Vo P1to
   60   10  2   158   158    70 0.44  1    60 0.54
   60   10  1   130    60    70 0.54  2   158 0.44
   60   44  2   981   981    42 0.04  2 1061 0.01
   60   44  2 1061 1061    12 0.01  2   981 0.04
CULATIONS
  Sop      Yo       Gu      Fs     P1      Gq    Pt      Gf        El     Fm    Flt
 1450 0.041   8.233 0.838 0.848  2.143 0.152  0.312    1.343 1.000 1.000
 3124 0.051   7.737 0.776 0.538  2.639 0.462  1.096    1.449 1.000 1.000
 3468 0.306 36.405 0.212 0.197  7.219 0.803  4.462    5.311 0.609 0.804
 3037 0.323 35.807 0.262 0.048  7.817 0.952  6.942    4.297 0.916 0.958

PACITY ANALYSIS WORKSHEET
R LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
  LT-TH-RT  166 3007 0.06 0.17   520 0.32
  LT-TH-RT  130 1372 0.09 0.17   237 0.55       *
  LT-TH-RT 1030 2586 0.40 0.73 1880 0.55       *
  LT-TH-RT 1114 3076 0.36 0.73 2237 0.50

CLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.49 TOTAL V/C= 0.55

VEL OF SERVICE WORKSHEET
R LN GROUP  v/c  g/C    C      d1     c       d2   PF   Delay LOS Avg Q  95% Q
  LT-TH-RT 0.32 0.17  60.0  16.51   520     0.13 0.85   14.14  B    2.2
  LT-TH-RT 0.55 0.17  60.0  17.23   237     2.03 0.85   16.37  C    1.8
  LT-TH-RT 0.55 0.73  60.0   2.82 1880     0.27 0.85    2.63  A    4.5
  LT-TH-RT 0.50 0.73  60.0   2.66 2237     0.15 0.85    2.39  A    4.8

F Delay LOS
  14.14  B
  16.37  C
   2.63  A
   2.39  A
TERSECTION DELAY =  4.03 INTERSECTION LOS=A

E CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
ICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

R A V/C RATIO OF .95 THE CYCLE SHOULD BE  12.5 SECONDS
E EXISTING TIMING IS OPTIMAL
```

```
NCH PROGRAM VERSION DATE 2-6-1987
85 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ACONESS HOSPITAL
OOKLINE/DEACONESS/PM/EXISTING+PROJECT
te:08-03-1987                  time:21:44:55
ST DATA SET NAMES LOADED OR SAVED
LUME=BRDJPMEP    GEOMETRICS=BRDJ         SIGNAL=BRKFR
CATED IN CBD:Y
LUME & GEOMETRICS
       VOLUMES          # OF LANES       LANE WIDTH       CROSS
R  LT    TH    RT      LT  TH  RT       LT    TH    RT     WALK
   63    11   163       0   2   0      0.0  12.0   0.0      0
   63     8    46       0   1   0      0.0  12.0   0.0      0
   38   800    45       0   2   0      0.0  12.0   0.0      0
   11   906    58       0   2   0      0.0  12.0   0.0      0

AFFIC & ROADWAY CONDITIONS
                ADJ PARK                 PEDESTRIANS         ARR
R GRADE %HV    Y/N MOVES BUSES   PHF  CROSS BUT MIN TIME  TYPE
   0.0%  0.0%    N      0     0   .900    0           7.0     3
   0.0%  0.0%    N      0     0   .900    0           7.0     3
   0.0%  0.0%    N      0     0   .900    0           7.0     3
   0.0%  0.0%    N      0     0   .900    0           7.0     3

ASINGS
  EASTBOUND   WESTBOUND   NORTHBOUND   SOUTHBOUND  GREEN   Y+R  PRE/ACT
  l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
  *  *  *     *  *  *                                11.4    3     A
                          *  *  *     *  *  *        42.6    3     A

CLE=  60.0

LUME ADJUSTMENT WORKSHEET
RT 1 (MOVEMENT ADJUSTMENTS)
R   LTV   THV   RTV   PHF   LTFR THFR RTFR
     63    11   163  .900     70   12  181
     63     8    46  .900     70    9   51
     38   800    45  .900     42  889   50
     11   906    58  .900     12 1007   64

RT 2 (LANE GROUP ADJUSTMENTS)
R LN GROUP   FLOW N    LU     v   Plt   Prt
  LT-TH-RT    263 2 1.05   277 0.27 0.69
  LT-TH-RT    130 1 1.00   130 0.54 0.39
  LT-TH-RT    981 2 1.05  1030 0.04 0.05
  LT-TH-RT   1083 2 1.05  1138 0.01 0.06

RT 3 (OPPOSING VOLUME ADJUSTMENTS)
T TURN                    OPPOSING APPROACH
ING OPPOSED         VOLUMES          % OPPOSING LEFT TURN      # LANES        OPPOSING
                  LT    TH    RT        LT    TH    RT       LT   TH   RT       VOLUME
STBOUND           70     9    51       100   100   100        0    1    0          60
STBOUND           70    12   181       100   100   100        0    2    0         263
RTHBOUND          12  1007    64       100   100   100        0    2    0        1083
JTHBOUND          42   889    50       100   100   100
```

```
URATION FLOW ADJUSTMENT WORKSHEET
 LN GROUP   IDEAL N  Fwid    Fhv    Fgr Fpark  Fbus Farea   Frt   Flt    s
 LT-TH-RT   1900  2 1.000 1.000 1.000 1.000 1.000 0.900 0.897 1.000 2906
 LT-TH-RT   1800  1 1.000 1.000 1.000 1.000 1.000 0.900 0.847 0.870 1194
 LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.993 0.791 2542
 LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.991 0.959 3080

PLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
UT VARIABLES
   C    G   N    Va    Vm   Vlt   Flt No    Vo Plto
  60   11   2   263   263    70 0.27  1    60 0.54
  60   11   1   130    60    70 0.54  2   263 0.27
  60   43   2   981   981    42 0.04  2 1083 0.01
  60   43   2 1083  1083    12 0.01  2   981 0.04
CULATIONS
 Soo      Yo      Gu     Fs     Fl      Gq    Pt     Gf        El    Fm    Flt
 1370 0.044  9.211 0.838 0.515  2.225 0.485  1.042     1.343 1.000 1.000
 3299 0.080  7.223 0.710 0.538  4.213 0.462  1.378     1.584 0.870 0.870
 3471 0.312 34.653 0.198 0.204  7.911 0.796  4.635     5.684 0.581 0.791
 2996 0.327 34.073 0.262 0.047  8.490 0.953  7.494     4.297 0.918 0.959

PACITY ANALYSIS WORKSHEET
 LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
  LT-TH-RT   277 2906 0.10 0.19  554 0.50
  LT-TH-RT   130 1194 0.11 0.19  228 0.57      *
  LT-TH-RT  1030 2542 0.41 0.71 1804 0.57      *
  LT-TH-RT  1138 3080 0.37 0.71 2185 0.52

CLE= 60.0  LOST= 6.0  SUM V/S CRIT= 0.51 TOTAL V/C= 0.57

VEL OF SERVICE WORKSHEET
 LN GROUP  v/c  g/C    C     d1    c       d2   PF    Delay LOS Avg Q  95% Q
  LT-TH-RT 0.50 0.19  60.0  16.51  554    0.61 0.85   14.55  B    3.6
  LT-TH-RT 0.57 0.19  60.0  16.76  228    2.52 0.85   16.39  C    1.8
  LT-TH-RT 0.57 0.71  60.0   3.24 1804    0.33 0.85    3.03  A    4.8
  LT-TH-RT 0.52 0.71  60.0   3.05 2185    0.19 0.85    2.75  A    5.2

 Delay LOS
  14.55  B
  16.39  C
   3.03  A
   2.75  A
TERSECTION DELAY =  4.82 INTERSECTION LOS=A

E CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
ICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

 A V/C RATIO OF .95 THE CYCLE SHOULD BE  13.1 SECONDS
E EXISTING TIMING IS OPTIMAL
```

```
NCH PROGRAM VERSION DATE 2-6-1987
35 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ACONESS HOSPITAL
OOKLINE/LONGWOOD/AM/EXISTING
te:08-03-1987                  time:21:51:18
ST DATA SET NAMES LOADED OR SAVED
LUME=BRLWAME      GEOMETRICS=BRLGWD       SIGNAL=BRLGWD
CATED IN CBD:Y
LUME & GEOMETRICS
       VOLUMES         # OF LANES      LANE WIDTH       CROSS
R   LT    TH    RT     LT TH RT      LT    TH    RT     WALK
   134   189    21      0  2  0     0.0 12.0   0.0       0
    59   115    91      0  2  0     0.0 12.0   0.0       0
    25   773   168      0  2  0     0.0 12.0   0.0       0
   177   465   114      0  2  0     0.0 12.0   0.0       0

AFFIC & ROADWAY CONDITIONS
                  ADJ PARK                 PEDESTRIANS          ARR
R  GRADE %HV    Y/N MOVES BUSES   PHF  CROSS BUT MIN TIME  TYPE
   0.0%  0.0%    N     0     0    .900    0          7.0     3
   0.0%  0.0%    N     0     0    .900    0          7.0     3
   0.0%  0.0%    N     0     0    .900    0          7.0     3
   0.0%  0.0%    Y     5     0    .900    0          7.0     3

ASINGS
  EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND  GREEN  Y+R  PRE/ACT
  l  t  r  p   l  t  r  p   l  t  r  p   l  t  r  p
  *  *  *      *  *  *                                  7.6   3    A
                            *  *  *      *  *  *       26.4   3    A

CLE=  40.0

LUME ADJUSTMENT WORKSHEET
RT 1 (MOVEMENT ADJUSTMENTS)
R   LTV   THV   RTV    PHF   LTFR  THFR  RTFR
    134   189    21   .900    149   210    23
     59   115    91   .900     66   128   101
     25   773   168   .900     28   859   187
    177   465   114   .900    197   517   127

RT 2 (LANE GROUP ADJUSTMENTS)
R  LN GROUP   FLOW  N   LU     v   Plt   Prt
   LT-TH-RT    382  2  1.05   401  0.39  0.06
   LT-TH-RT    294  2  1.05   309  0.22  0.34
   LT-TH-RT   1073  2  1.05  1127  0.03  0.17
   LT-TH-RT    840  2  1.05   882  0.23  0.15

RT 3 (OPPOSING VOLUME ADJUSTMENTS)
FT TURN                      OPPOSING APPROACH
ING OPPOSED            VOLUMES          % OPPOSING LEFT TURN      # LANES       OPPOSING
                    LT    TH    RT         LT    TH    RT       LT   TH   RT     VOLUME
ASTBOUND            66   128   101        100   100   100        0    2    0      294
ESTBOUND           149   210    23        100   100   100        0    2    0      382
ORTHBOUND          197   517   127        100   100   100        0    2    0      8
```

```
URATION FLOW ADJUSTMENT WORKSHEET
 LN GROUP  IDEAL N  Fwid   Fhv    Fgr Fpark  Fbus Farea   Frt   Flt     s
 LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.991 0.952 3055
 LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.948 0.933 2867
 LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.974 0.923 2911
 LT-TH-RT   1800  2 1.000 1.000 1.000 0.937 1.000 0.900 0.977 0.648 1923

PLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
UT VARIABLES
   C    G  N    Va    Vm   Vlt  Plt No    Vo Plto
  40    8  2   382   382   149 0.39  2   294 0.22
  40    8  2   294   294    66 0.22  2   382 0.39
  40   26  2  1073  1073    28 0.03  2   840 0.23
  40   26  2   840   840   197 0.23  2  1073 0.03
.CULATIONS
 Sop      Yo      Gu     Fs     Pl      Gq .  Pt      Gf          El     Fm    Flt
 3074 0.096   4.137 0.691 0.790   3.435 0.210   0.494       1.628 0.903 0.952
 2892 0.132   2.634 0.636 0.496   4.938 0.504   1.660       1.769 0.866 0.933
 1751 0.480 13.913 0.350 0.099 12.514 0.901   8.726       3.214 0.845 0.923
 3405 0.315 20.180 0.204 0.952   6.248 0.048   0.101       5.510 0.296 0.648

ACITY ANALYSIS WORKSHEET
 LN GROUP     v     s   v/s  g/C     c   v/c  CRITICAL
  LT-TH-RT   401 3055 0.13 0.19  578 0.69      *
  LT-TH-RT   309 2867 0.11 0.19  543 0.57
  LT-TH-RT  1127 2911 0.39 0.66 1923 0.59
  LT-TH-RT   882 1923 0.46 0.66 1270 0.69      *

LE= 40.0  LOST= 6.0  SUM V/S CRIT= 0.59 TOTAL V/C= 0.69

EL OF SERVICE WORKSHEET
 LN GROUP   v/c  g/C    C      d1     c      d2   PF    Delay LOS Avg Q  95% Q
  LT-TH-RT 0.69 0.19  40.0  11.50   578    2.49 0.85   11.89  B    3.4
  LT-TH-RT 0.57 0.19  40.0  11.20   543    1.07 0.85   10.43  B    2.7
  LT-TH-RT 0.59 0.66  40.0   2.86 1923    0.35 0.85    2.72  A    4.0
  LT-TH-RT 0.69 0.66  40.0   3.23 1270    1.17 0.85    3.74  A    3.2

 Delay LOS
  11.89  B
  10.43  B
   2.72  A
   3.74  A
TERSECTION DELAY =  5.28 INTERSECTION LOS=B

E CYCLE LENGTH WITHIN THE BOUNDS OF  40  TO  120 SECONDS
ICH MINIMIZES CRITICAL MOVEMENT DELAY IS  40.0 SECONDS

 A V/C RATIO OF .95 THE CYCLE SHOULD BE  15.8 SECONDS
E EXISTING TIMING IS OPTIMAL
```

```
NCH PROGRAM VERSION DATE 2-6-1987
85 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ACONESS HOSPITAL
OOKLINE/LONGWOOD/AM/EXISTING+PROJECT
te:08-03-1987                   time:21:54:44
ST DATA SET NAMES LOADED OR SAVED
LUME=BRLWAMEP    GEOMETRICS=BRLGWD       SIGNAL=BRLGWD
CATED IN CBD:Y
LUME % GEOMETRICS
      VOLUMES          # OF LANES       LANE WIDTH       CROSS
R  LT    TH    RT      LT  TH  RT       LT    TH    RT     WALK
  134   189    21       0   2   0      0.0  12.0   0.0     0
   59   115    91       0   2   0      0.0  12.0   0.0     0
    5   773   168       0   2   0      0.0  12.0   0.0     0
  177   477   102       0   2   0      0.0  12.0   0.0     0

AFFIC % ROADWAY CONDITIONS
               ADJ PARK                   PEDESTRIANS          ARR
R GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
  0.0%  0.0%    N     0     0   .900   0            7.0    3
  0.0%  0.0%    N     0     0   .900   0            7.0    3
  0.0%  0.0%    N     0     0   .900   0            7.0    3
  0.0%  0.0%    Y     5     0   .900   0            7.0    3

ASINGS
  EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
  l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
  *  *  *     *  *  *                                7.7   3    A
                          *  *  *     *  *  *      26.3   3    A

CLE=  40.0

LUME ADJUSTMENT WORKSHEET
RT 1 (MOVEMENT ADJUSTMENTS)
R   LTV   THV   RTV    PHF  LTFR THFR RTFR
    134   189    21   .900   149  210   23
     59   115    91   .900    66  128  101
      5   773   168   .900     6  859  187
    177   477   102   .900   197  530  113

RT 2 (LANE GROUP ADJUSTMENTS)
  LN GROUP   FLOW N   LU     v   Plt  Prt
  LT-TH-RT    382 2 1.05   401 0.39 0.06
  LT-TH-RT    294 2 1.05   309 0.22 0.34
  LT-TH-RT   1051 2 1.05  1104 0.01 0.18
  LT-TH-RT    840 2 1.05   882 0.23 0.13

RT 3 (OPPOSING VOLUME ADJUSTMENTS)
FT TURN                   OPPOSING APPROACH
ING OPPOSED          VOLUMES       % OPPOSING LEFT TURN     # LANES       OPPOSING
                    LT   TH   RT      LT   TH   RT        LT  TH  RT      VOLUME
STBOUND             66  128  101     100  100  100         0   2   0        294
STBOUND            149  210   23     100  100  100         0   2   0        382
RTHBOUND           197  530  113     100  100  100         0   2   0        84
UTHBOUND             6  859  187     100  100  100
```

```
NCH PROGRAM VERSION DATE 2-6-1987
85 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ACONESS HOSPITAL
OOKLINE/LONGWOOD/PM/EXISTING
te:08-03-1987                time:22:10:07
ST DATA SET NAMES LOADED OR SAVED
LUME=BRLWPME     GEOMETRICS=BRLGWD      SIGNAL=BRLGWD
CATED IN CBD:Y
LUME & GEOMETRICS
        VOLUMES          # OF LANES      LANE WIDTH       CROSS
R   LT     TH     RT      LT  TH  RT       LT    TH    RT      WALK
B    58   194     21       0   2   0      0.0  12.0   0.0       0
B   170   217    151       0   2   0      0.0  12.0   0.0       0
B    50   738    121       0   2   0      0.0  12.0   0.0       0
B   168   764    106       0   2   0      0.0  12.0   0.0       0

RAFFIC & ROADWAY CONDITIONS
                  ADJ PARK                  PEDESTRIANS         ARR
IR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
B  0.0%   0.0%    N     0     0    .900    0         7.0    3
B  0.0%   0.0%    N     0     0    .900    0         7.0    3
B  0.0%   0.0%    N     0     0    .900    0         7.0    3
B  0.0%   0.0%    Y     5     0    .900    0         7.0    3

HASINGS
   EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND GREEN  Y+R PRE/ACT
   l  t  r  p   l  t  r  p   l  t  r  p   l  t  r  p
1  *  *  *      *  *  *                                19.7   3     A
2                            *  *  *      *  *  *      51.3   3     A

YCLE=  77.0

OLUME ADJUSTMENT WORKSHEET
ART 1 (MOVEMENT ADJUSTMENTS)
IR   LTV   THV   RTV    PHF   LTFR THFR RTFR
B     58   194    21   .900     64  216   23
B    170   217   151   .900    189  241  168
B     50   738   121   .900     56  820  134
B    168   764   106   .900    187  849  118

ART 2 (LANE GROUP ADJUSTMENTS)
IR LN GROUP   FLOW N    LU     v   Plt  Prt
B  LT-TH-RT    303 2 1.05   319 0.21 0.08
B  LT-TH-RT    598 2 1.05   628 0.32 0.28
B  LT-TH-RT   1010 2 1.05  1061 0.06 0.13
B  LT-TH-RT   1153 2 1.05  1211 0.16 0.10

ART 3 (OPPOSING VOLUME ADJUSTMENTS)
EFT TURN                  OPPOSING APPROACH
EING OPPOSED          VOLUMES        % OPPOSING LEFT TURN     # LANES       OPPOSING
                    LT    TH    RT       LT    TH    RT        LT  TH  RT      VOLUME
ASTBOUND           189   241   168      100   100   100         0   2   0        598
ESTBOUND            64   216    23      100   100   100         0   2   0        303
ORTHBOUND          187   849   118      100   100   100         0   2   0       1153
```

```
TURATION FLOW ADJUSTMENT WORKSHEET
R LN GROUP   IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
  LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.988 0.673 2155
  LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.958 0.822 2550
  LT-TH-RT   1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.980 0.627 1990
  LT-TH-RT   1800  2 1.000 1.000 1.000 0.937 1.000 0.900 0.995 0.630 1885

PPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
PUT VARIABLES
R  C   G  N   Va   Vm   Vlt  Plt No   Vo Plto
  77  20  2  303  303   64 0.21  2  598 0.32
  77  20  2  598  598  189 0.32  2  303 0.21
  77  51  2 1010 1010   56 0.06  2 1153 0.16
  77  51  2 1153 1153  187 0.16  2 1010 0.06
LCULATIONS
R Sop     Yo      Gu     Fs    PI      Gq    Pt     Gf        El    Fm   Flt
  2993 0.200  5.357 0.501 0.794 14.307 0.206  0.519     2.244 0.346 0.673
  2848 0.107 12.829 0.685 0.783  6.836 0.217  0.550     1.641 0.644 0.822
  2271 0.508 24.855 0.154 0.394 26.481 0.606  3.073     7.297 0.253 0.627
  2674 0.378 35.757 0.244 0.791 15.579 0.209  0.530     4.615 0.261 0.630

PACITY ANALYSIS WORKSHEET
R LN GROUP     v     s  v/s  g/C     c  v/c  CRITICAL
B  LT-TH-RT   319 2155 0.15 0.26   550 0.58
B  LT-TH-RT   628 2550 0.25 0.26   651 0.96      *
B  LT-TH-RT  1061 1990 0.53 0.67  1327 0.80
B  LT-TH-RT  1211 1885 0.64 0.67  1257 0.96      *

YCLE= 77.0  LOST= 6.0  SUM V/S CRIT= 0.89 TOTAL V/C= 0.96

VEL OF SERVICE WORKSHEET
R LN GROUP  v/c  g/C    C      d1    c      d2   PF    Delay LOS Avg Q  95% Q
B  LT-TH-RT 0.58 0.26  77.0  19.04  550    1.13 0.85   17.14  C    4.8
B  LT-TH-RT 0.96 0.26  77.0  21.52  651   19.56 0.85   34.92  D   10.6
B  LT-TH-RT 0.80 0.67  77.0   6.96 1327    2.51 0.85    8.05  B    7.2
B  LT-TH-RT 0.96 0.67  77.0   9.09 1257   12.90 0.85   18.70  C   10.1

IR Delay LOS
B  17.14  C
B  34.92  D
B   8.05  B
B  18.70  C
NTERSECTION DELAY = 18.20 INTERSECTION LOS=C

HE CYCLE LENGTH WITHIN THE BOUNDS OF  40  TO  120 SECONDS
HICH MINIMIZES CRITICAL MOVEMENT DELAY IS  77.0 SECONDS

OR A V/C RATIO OF .95 THE CYCLE SHOULD BE  92.9 SECONDS
HE EXISTING TIMING IS OPTIMAL
```

```
NCH PROGRAM VERSION DATE 2-6-1987
85 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
EACONESS HOSPITAL
OOKLINE/LONGWOOD/PM/EXISTING+PROJECT
ate:08-03-1987                time:22:14:02
AST DATA SET NAMES LOADED OR SAVED
OLUME=BRLWPMEP   GEOMETRICS=BRLGWD       SIGNAL=BRLGWD
OCATED IN CBD:Y
LUME & GEOMETRICS
       VOLUMES          # OF LANES        LANE WIDTH       CROSS
IR  LT   TH    RT     LT TH RT       LT    TH    RT      WALK
    58  194    21      0  2  0      0.0  12.0   0.0       0
   170  217   151      0  2  0      0.0  12.0   0.0       0
    50  738   121      0  2  0      0.0  12.0   0.0       0
   168  784    86      0  2  0      0.0  12.0   0.0       0

AFFIC & ROADWAY CONDITIONS
                    ADJ PARK                    PEDESTRIANS           ARR
R  GRADE  %HV    Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME TYPE
    0.0%  0.0%    N      0     0   .900    0            7.0    3
    0.0%  0.0%    N      0     0   .900    0            7.0    3
    0.0%  0.0%    N      0     0   .900    0            7.0    3
    0.0%  0.0%    Y-     5     0   .900    0            7.0    3

ASINGS
   EASTBOUND     WESTBOUND     NORTHBOUND    SOUTHBOUND  GREEN   Y+R  PRE/ACT
   l   t   r   p   l   t   r   p   l   t   r   p   l   t   r   p
   *   *   *       *   *   *
                                                           19.7    3     A
                                   *   *   *       *   *   *   51.3    3     A
CLE=  77.0

UME ADJUSTMENT WORKSHEET
RT 1 (MOVEMENT ADJUSTMENTS)
   LTV   THV   RTV    PHF   LTFR THFR RTFR
    58   194    21   .900     64  216   23
   170   217   151   .900    189  241  168
    50   738   121   .900     56  820  134
   168   784    86   .900    187  871   96

RT 2 (LANE GROUP ADJUSTMENTS)
   LN GROUP   FLOW N   LU      v   Plt  Prt
   LT-TH-RT    303 2 1.05    319 0.21 0.08
   LT-TH-RT    598 2 1.05    628 0.32 0.28
   LT-TH-RT   1010 2 1.05   1061 0.06 0.13
   LT-TH-RT   1153 2 1.05   1211 0.16 0.08

RT 3 (OPPOSING VOLUME ADJUSTMENTS)
T TURN
ING OPPOSED                        OPPOSING APPROACH
                      VOLUMES          % OPPOSING LEFT TURN       # LANES       OPPOSING
                  LT    TH    RT       LT    TH    RT         LT   TH   RT      VOLUME
STBOUND          189   241   168      100   100   100          0    2    0        598
STBOUND           64   216    23      100   100   100          0    2    0        303
RTHBOUND         187   871    96      100   100   100          0    2    0       1153
UTHBOUND          56   820   134
```

```
ADJUSTMENT WORKSHEET
IR LN GROUP  IDEAL N  Fwid   Fhv   Fgr   Fpark  Fbus  Farea  Frt   Flt    s
   LT-TH-RT  1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.988 0.677 215
   LT-TH-RT  1800  2 1.000 1.000 1.000 1.000 1.000 0.900 0.958 0.822 255
B  LT-TH-RT  1900  2 1.000 1.000 1.000 1.000 1.000 0.900 0.980 0.626 1989
B  LT-TH-RT  1800  2 1.000 1.000 1.000 0.937 1.000 0.900 0.988 0.630 189

UPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
NPUT VARIABLES
IR  C   G  N   Va   Vm   Vlt  Plt No   Vo Plto
B  77  20  2  303  303   64 0.21  2  598 0.32
B  77  20  2  598  598  189 0.32  2  303 0.21
B  77  51  2 1010 1010   56 0.06  2 1153 0.16
B  77  51  2 1153 1153  187 0.16  2 1010 0.06
ALCULATIONS
IR Sop    Yo     Gu     Fs     Pl     Gq     Pt     Gf          El     Fm    Flt
B 2993 0.200  5.408 0.501 0.793 14.297 0.207  0.522       2.244 0.347 0.677
B 2848 0.107 12.873 0.685 0.783  6.831 0.217  0.550       1.641 0.644 0.822
B 2271 0.508 24.773 0.154 0.394 26.523 0.606  3.070       7.297 0.253 0.526
B 2674 0.378 35.692 0.244 0.791 15.604 0.209  0.529       4.615 0.260 0.630

APACITY ANALYSIS WORKSHEET
IR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
B  LT-TH-RT  319 2156 0.15 0.26  552 0.58
B  LT-TH-RT  628 2551 0.25 0.26  653 0.96      *
B  LT-TH-RT 1061 1989 0.53 0.67 1325 0.80
E  LT-TH-RT 1211 1890 0.64 0.67 1259 0.96      *

YCLE= 77.0  LOST= 6.0  SUM V/S CRIT= 0.89 TOTAL V/C= 0.96

EVEL OF SERVICE WORKSHEET
IR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
B  LT-TH-RT 0.58 0.26 77.0 19.01  552    1.11 0.85  17.10  C   4.8
B  LT-TH-RT 0.96 0.26 77.0 21.49  653   19.16 0.85  34.55  D  10.5
B  LT-TH-RT 0.80 0.67 77.0  6.98 1325    2.54 0.85   8.09  B   7.2
B  LT-TH-RT 0.96 0.67 77.0  9.08 1259   12.61 0.85  18.43  C  10.0

IR Delay LOS
B  17.10  C
B  34.55  D
B   8.09  B
   18.43  C
TERSECTION DELAY = 18.04 INTERSECTION LOS=C

E CYCLE LENGTH WITHIN THE BOUNDS OF  40  TO  120 SECONDS
ICH MINIMIZES CRITICAL MOVEMENT DELAY IS  77.0 SECONDS

F A V/C RATIO OF .95 THE CYCLE SHOULD BE 90.2 SECONDS
E EXISTING TIMING IS OPTIMAL
```

Exhibit B

Property Description

A certain parcel of land, situated on Brookline Avenue, in Boston, Suffolk County, Massachusetts, as shown on a plan entitled "Plan of Land, Deaconess Road in Boston, Mass" dated April 17, 1987 and prepared by Boston Survey Consultants, bounded and described as follows:

Beginning at a point on the northerly side of Brookline Avenue, at the Southeasterly corner of the premises at the intersection of Deaconess Road and Brookline Avenue and thence running

SOUTH 40°18"15" WEST by Brookline Avenue, two hundred seventy and 95/100 (270.95) feet more or less; thence turning and running

NORTH 46°57'52" WEST by land shown on the plan as Lots 9 and 8 respectively, eighty-six and 50/100 (86.50) feet; thence continuing

NORTH 50°46'38" WEST by land shown on the plan as lot 10, twenty-nine and 42/100 (29.42) feet; thence turning and running

NORTH 40°15'28" EAST by land shown on the plan as lots 7B and 4B respectively, one hundred fourteen and 20/100 (114.20) feet; thence turning and running

NORTH 49°40'29" WEST by land shown on the plan as lots 4B and 3B respectively, one hundred seventy and 47/100 (170.47) feet; thence turning and running

NORTH 40°15'28" EAST by Pilgrim Road, seventy-one and 57/100 (71.57) feet; thence turning and running

NORTH 49°44'32" WEST across Pilgrim Road, forty-eight (48.00) feet; thence turning and running

NORTH 40°15'28" EAST by Pilgrim Road, 66/100 (.66) feet; thence continuing

NORTHERLY by Pilgrim Road, by a line curving to the right having a radius of forty-four and 78/100 (44.78) feet, a distance of nineteen and 07/100 (19.07) feet; thence continuing

NORTH 40°15'28" EAST by Pilgrim Road, forty-four (44) feet; thence turning and running

SOUTH 49°41'05" EAST back across Pilgrim Road and by Deaconess Road, three hundred twenty-six and 51/100 (326.51) feet to the point of beginning.

Containing sixty thousand, six hundred fifty-five (60,655) square feet of land, more or less, according to the plan.

BOSTON PUBLIC LIBRARY

3 9999 06315 710 9